INDEX

For Volume 62

INDEX FOR VOLUME 62

AUTHOR AND SUBJECT INDEX. Junior authorship is indicated by page numbers in parentheses. Page numbers of illustrations are in boldface. A special listing is made of "new diseases, species, and varieties". Pages of errata are in brackets.

Aapola, A. I. E., 1101
Abawi, G. S., 870
Abies concolor
  Armillaria mellea on, rhizomorphs vs. root lipid, 1347
  wetwood of, bacterium association, 384
Abo-El-Dahab, M. K., 294
Acacia koa, decline of, in Hawaii, 770
Acedo, G., (780)
Acer saccharum
  Armillaria mellea on, growth in roots affected by defoliation, 1278
  decay in tapholes, 789
  zonate leaf spot of, host range of, 758
Achromobacter sp., Pseudomonas phaseolicola interaction, cell degradation from, 775
Acyrthosiphon pisum
  pea enation mosaic virus vector, protein patterns, 1018
  TMV and brome mosaic virus in, 429, **431**, **432**
aerobiology, powdery mildews, diurnal periodicity in, 1099
aflatoxin
  in corn kernels, relation to Helminthosporium maydis ear rot, 1367
  detoxification by Aspergillus niger, 749
  in Helminthosporium maydis-damaged corn, 802
  inhibition by Aspergillus niger, 668
  on soybean
    DMSO effects, 753
    role of Aspergillus flavus in, 745
African maize streak, electron microscopy of, 671
Agallia constricta, wound tumor virus increased, assay for, 784
Agaricus bisporus
  fungi associated with, thermal sensitivity of, 1470
  parasitism by Verticillium malthousei, 498
Agrios, G. N., (494), (497)
Agrobacterium tumefaciens
  cytochromes of, 933
  on peach & almond, relation to Armillaria, 783
  RNA polymerase activity affected by, 498
Agrostis palustris
  Ustilago striiformis on
    benomyl for, 533
    relation to inflorescence growth, 583
Ainslie, V., (536)
air pollution (see **pollution**, air-)
Aist, S., (536)
Albersheim, P., (744), (757)
Albert, J. J., 667
Albizzia julibrissin, Fusarium oxysporum perniciosum on, benomyl for, 744
Albrigo, L. G., (748), (1434)
Albuquerque, F., (144)
Alconero, R., 144, 667, 993
Alcorn, S. M., (764)
Aldwinckle, H. S., 493, 743
Alexander, S. A., 667, 743
alfalfa
  Corynebacterium insidiosum on
    common antigen vs. disease, 1351
    resistance to, 555
  Ditylenchus dipsaci on, temp effect, 761
  medicarpin produced in, by fungi on, 499
  Meloidogyne hapla on, electron microscopy, 792
  ozone injury to, 759
  root knot nematodes on, resistant clones in, **780**, **1103**
alfalfa mosaic virus
  electron microscopy, 798
  Phytophthora synergism, 760
Alfieri, S. A., Jr., (12), 647, 801
Allam, A. I., 634, (764)
Allen, E. H., 471, 667, 743
Allen, R. M., (749), (792)
Allium spp., white rot of, propagule enumeration for pathogen, 545
  cepa (see **onion**)
Almeyda, N., (144)
Alternaria sp., spore germination affected by tobacco smoke, 670
  alternata, on tobacco, biological control of, 807
  dianthi, on carnation, 11
  tenuis
    on passion fruit vines, toxin from, 744
    tentoxin from, transpiration effect, 755
Altman, J., (705), 743
Amanita rubescens, fatty acids & sterols from, 777
American Phytopathological Society
  annual meeting abstracts, 743
  division abstracts
    Caribbean, 11
    North Central, **1107**
    Northeastern, **493**
    Pacific, **1101**
    Potomac, 667
    Southern, 801
  fellows, 7
  Ruth Allen award, 5
  symposium, genetic vs. disease physiology, 392
2-aminobutane, mechanism of action on fungi, 239
Ammon, V., 743
ammonia, toxicity to wheat & peas, 86
Amylostereum areolatum, on Pinus radiata, symbiosis with Sirex, 1407
Anagnostakis, S. L., (494), (753)
Anderson, A., 744, (757)
Anderson, N. A., 1057
Anderson, R. E., (790)
Anderson, W. C., (1102)
Andrews, J. H., 744
Anjaneyulu, A., 1116
Anthurium andraeanum, Aphelenchoides fragariae in leaves of, 767
antibiotics
  oxytetracycline, on aster, effect on clover phyllody agent, 50, **55**, 377
  Pseudomonas solanacearum affected by, 1373
Aphanomyces sp., on Echinodorus brevipedicellatus, symptoms, 806
  euteiches
    relation to nematodes on pea, 369, **371**
    sporulation of, 788
    ultrastructure of, in spore formation, 149, **151–158**
Aphelenchoides fragariae, on Anthurium seedling leaves, 767
apple (see also **Malus sylvestris**)
  canker of, fungicides for, 755
  chlorotic leaf spot vs. stem-grooving virus, transmission of, 585
  decline of, related to stem pitting & grooving, 695, **696–698**
  diseases identified by aerial photography, 776
  fireblight of, predisposing factors for, 176, **178**
  Glomerella cingulata on, pathogenicity on birch compared, 1366
  Phytophthora cactorum on, resistance to, 743

postharvest decay of, chemical control of, 746
powdery mildew of, spore release in, 1099
russet ring virus of, properties, 494
scab of, phenylmercuric acetate & triarimol for, 791
sooty blotch of, benomyl & triarimol for, 668
in storage, postharvest dips for, 500
tobacco necrosis virus from, properties of, 478
triarimol for control of rot, 669
virus-infected buds of, physiological changes induced in, 787
virus infection
enzyme relations, 778
vs. respiration & organic acids, 497
apple stem-grooving virus, transmission of, 495
apple stem-pitting virus, dwarfing rootstocks for, 777
Arachis hypogaea (see **peanut**)
Aragaki, M., (676)
Araucaria angustifolia, new root disease of, in Brazil, 898, [32]
Arceuthobium
campylopodum, on ponderosa pine, growth response, 769
occidentale, on Pinus sabiniana, effect of light on, 1271, **1272**
Armillaria spp., on citrus, Trichoderma vs. methyl bromide, 781
mellea
occurrence in crown gall of peach & almond, 783
on peach, seasonal changes, 567
rhizomorph in, fatty acids & lipid stimulants of, 264, 1347
on sugar maple, growth in roots affected by defoliation, 1278
Arny, D. C., (794)
aroids, dasheen mosaic virus of, in Florida, 804
Ashcraft, G., (760)
Ashworth, L. J., Jr., 715, 744, (766), 901
aspen (see also **Populus** tremuloides)
Ceratocystis canker of, 213
insect transmission in, 221
Aspergillus spp., aflatoxin-producing strains of, on peanut genotypes, 771
flavus
aflatoxin from, in soybean, 745
effect of DMSO, 753
aflatoxin inhibited by A. niger, 668
peanut flower infection by, gnotobiotic study, 797
in peanut geocarposphere, conidial germination & population, 1387
on peanut, gnotobiotically grown, fungus interactions, 1238
propagule density in soil, 669
niger
aflatoxin
detoxification by, 749
inhibited by, 668
on onion, nuclear reaction to, 770
propagule density in soil, 669
ruber
pea seed deterioration from, 495
on stored pea seed
involved, 209, **211**
toxins of, 206
aster
clover phyllody of
chemical & insect factors affecting, 377
related to oxytetracycline & leafhoppers to, 50
aster yellows (see also **mycoplasma**)
chemotherapy of, 111, **113**
Athow, K. L., (771)
Attabhanyo, A., 744
Ausmus, B. S., (804), 1070
Averre, C. W., 11, (786)
avocado (see **Persea americana**)
Ayers, J. E., 493
Azaldin, M. Y., 744
azalea
Calonectria & Cylindrocladium spp. compared for pathogenicity, 647
Cylindrocladium spp. on
leaf traps for, 736
microsclerotia in, 772
Rhizoctonia root rot of, fertilizer effect, 808

Backman, P. A., 744, 745
bacteria (see also under specific genera)
avirulent spp. for fire blight control, 777
cowpea seedling reaction to, 770
hypersensitive relation to incompatible spp., on tobacco, 780
oak lumber honeycomb & ring failure associated with, 796
rind necrosis of watermelon association, in Florida, 804
soft rot in vegetables, occurrence, 778
bacteriophage, Corynebacterium michiganese detected by, 755
Bailey, D. L., (520)
Bailey, W. K., (748)
Bain, D. C., 801
Baker, R., (602), (765), (1475)
Bald, J. G., 745
Baldwin, R. E., 667
Ball, E. M., (1214)
Ballantyne, B., 1101
banana, viruses of, seed transmission by, 760
Banfield, W. M., 493
Banttari, E. E., 745, (783)
Barham, R. O., 801
Bar-Joseph, M., (1453)
Barker, A. W., (306), (550)
Barker, K. R., (786), 801, 1201
Barksdale, T. H., 660
barley
Erysiphe graminis on, appressoria vs. cuticle, 708, **712**
mercury in, from seed treatment, 766
mildew of, secondary infection hyphae, 876
powdery mildew of
effect of ozone on, 1144
segregation of genes & hyphal formation in pathogen, 1219
barley stripe mosaic virus
concentration & infectivity of, 1110
RNA components in, characterization of, 767
barley yellow dwarf virus
Schizaphis graminum vector for, 921
on wheat, physiological factors affecting, 290, 587
Barlow, J. C., (795)
Barnett, N. M., (668)
Barnett, O. W., 745, 801
Barnett, R. D., (414)
Bartnicki-Garcia, S., (790)
Bartz, J. A., 239, (771), (791), 1085
Bateman, D. F., (495), (767)
Batra, C. K., 802
Baxter, L. W., Jr., (803), 805
Beachy, R. N., 1107
bean (see **Phaseolus** vulgaris)
bean common mosaic virus, local lesion host for, 489
Bean, G. A., (668), 745, (777)
bean mosaic virus, on Vigna sinensis, characterization of, 754
bean pod mottle virus
on bean, inhibited by soybean mosaic virus, 887

multiplication affected by protein & nucleic acid inhibitors, 1108
overwintering in leaf beetles, 808
soybean mosaic virus simultaneous infection, 839, **841**, **843**
bean yellow mosaic virus
on bean, seed transmission of, 768
hypersensitivity to, in red clover, 754
bean yellow stipple virus, properties & transmission of, 759
Beckman, C. H., (651), 745, (779), (1232), 1256
Beckman, K. M., 746
Beer, S. V., 746
beet mosaic virus, necrotic strain of, on sugar beet, 1103
beet western yellows virus
relation to lettuce mosaic virus & internal rib necrosis of lettuce, 1141
serological relation to turnip yellows virus, 1274
ultrastructural changes in sugar beet cells, 1103
beet yellow stunt, on sugar beet & lettuce, 161, **162**
Bega, R. V., (770)
Bell, D. K., (442), (808)
Belladonna mottle virus, relation to virus on Physalis, 1109
Belonolaimus longicaudatus, survival affected by soil texture, 670
Beltrá, R., 933
Benedict, W. G., 746
Beniwal, S. P., 802, (805)
Benner, H. I., (764)
benomyl (see **fungicides**, specific)
benzimidazole (see **fungicides**, specific)
Beraha, L., 746
Berger, R. D., 11, 746
Bergquist, R. R., 889
Beta vulgaris (see **sugar beet**)
Betula pendula, Glomerella cingulata on, pathogenicity on apple compared, 1366
Beute, M. K., (783)
Beutel, J. A., (779)
Bianchini, R., (760)
Biehn, W. L., 493, 747
Billeter, B. A., (746)
Binyamini, N., 592
biological control
Fusarium roseum 'Culmorum' from carnation, bacteria antagonistic to, 1052
mycorrhizae to Phytophthora cinnamomi, on sand pine, 1197
Sclerotium blight of lupine, tomato, & peanut, 442
Birchfield, W., 747
Black, L. L., 747
Black, L. M., (765), (776), (1112)
black rot of cabbage, inheritance of resistance to, 247
Blair, R. L., 747
Blanchard, R. O., 747
Blankenship, B. R., (752)
Blazquez, C. H., 11
Blizzard, J. W., (796)
Bloom, J. R., 667
Bloomberg, W. J., 481
blueberry
Botryosphaeria corticis on, sporulation & infection factors, 137
Botryosphaeria dothidea on, histopathology & pathogenicity of, 654, **656**, **657**, **659**
storage fungi of, 68
tomato ringspot virus of, 1104
bluegrass (see **Poa pratensis**)
Boatman, S., (673), (793)
Bode, W. M., (669)
Body, D. E., (683)
Bolkan, H., 748
Boosalis, M. G., (1110)
Boothroyd, C. W., (172), (503)
Born, G. L., 926
Bose, E., (579)
Botryodiplodia theobromae, spore germination in, protein synthesis during, 795
Botryosphaeria
corticis, factors affecting sporulation & infection on blueberry, 137
dothidea, on blueberry, histopathology & pathogenicity, 654, **656**, **657**, **659**
Botryotinia squamosa, sporulation in, factors affecting, 889
Botrytis sp., on tobacco seedlings, benomyl for, 500
cinerea
on carnation, 11
macadamia blight from, epidemiology of, 316
spore germination of
inhibited by capsidiol & cepsenone, 1186
nutrient effects, 1107
on tomato, role of plant leachates, 750
squamosa
on onion, fungicides for, 773
selective medium for, 494
Bowman, T., (278)
Bowyer, J. W., 1101
Boyle, J. S., (496), (1303)
Bozarth, R. F., 493, 748, (753), (823), (1023)
Bradfute, O. E., 748
Brakke, M. K., (767)
Brassica
campestris var. chinenis, Fusarium oxysporum & turnip mosaic virus interaction on seedlings of, 1424
oleracea (see also **cabbage**)
black rot of, factors affecting, 722
Xanthomonas campestris on, fluorescing materials in, 858, **861–863**
Braun, A. J., 748
Brennan, E. G., (496), (498), (499)
Brewbaker, J. L., (769)
Bricker, J., (191)
Bristow, P. R., 1107
broad bean mottle virus, on Vicia faba, protein synthesis in, 771
Bromfield, K. R., 748
Brooks, O. L., (1137)
Brown, G. E., 748, 1434
Brown, M. F., 749, (798)
Browning, J. A., (749)
Bruehl, G. W., (1040)
Buddenhagen, I. W., 11, (1373)
Burk, L. G., (672)
Burke, D. W., 306, 550, 1101
Burleigh, J. R., 944, 947
Burnett, C., 668, 749
Burns, E. E., 749
Burroughs, R., (787)
Bush, D. L., (807)
Bustamante-R., E., 749
Butler, E. E., (748)
Byers, R. A., (496)
Byther, R. S., 120, 466

cabbage (see also **Brassica** oleracea)
black rot of, inheritance of resistance to, 247, **248**, **249**
head rot & spot of, freezing injury to, 322
Sclerotinia sclerotiorum on, fungicides for, 1102
Calavan, E. C., (729), (758), (1102)

calcium
relation to tobacco black-shank index, 302
role in air pollution injury to cucumber & tomato pollen & fruit, 1247
in tomato, curly top disease effect on, kinetic analysis, 43
Caldwell, R. L., 749
Callbeck, L. C., (92)
Calocedrus decurrens, Armillaria mellea on, rhizomorphs vs. root lipid, 1347
Calonectria spp., morphology & pathogenicity to peach & lupine, 485
crotalariae, comparison with C. theae, 647
rigidiuscula, heterothallic clones of, 12
theae, on azalea, pathogenicity compared to Cylindrocladium, 647, **648**
Calpouzos, L., (931)
Calvert, O. H., 749, (798)
Camellia spp., Glomerella dieback & canker of, resistance to, 806
Campana, R. J., 750
Campbell, R. N., 750, (751)
Canavalia ensiformis, phytoalexin from, by Phytophthora megasperma, 1365
Cannon, O. S., (183), (187), (564)
Cappellini, R. A., 68, (501)
Capsicum (see also **pepper**)
annuum
aphids & viruses on, mulch for, 747
tobacco etch virus on, yield effect, 808
Xanthomonas vesicatoria on
hypersensitivity to, 752
on leaf of, NH_3 toxicity, 882
frutescens, capsidiol produced in, detoxified by fungi, 1186
Carapa guianensis, decay resistance of, in Brazil, 784
carboxin (see **fungicides**, specific)
Card, L. C., (792), (1112), (1314)
Cardwell, V. B., (964)
Carey, J., (756)
Carissa grandiflora, Rhizoctonia blight of, 801
carnation (see also **Dianthus caryophyllus**)
Fusarium oxysporum dianthi on, histopathology of, 782, 1318, **1320–1324**
Fusarium roseum on, antagonistic soil bacteria to, 1052, **1053**, **1055**
carnation etched ring virus, nucleic acid in, deoxyribonuclease digestion of, 810
carnation mottle virus, properties of, 959, **961**
Carnegiea gigantea, virus from, characterization of, 739, **741**
Carroll, R. B., 555, 1351
carrot, Xanthomonas carotae on, first Wisconsin observation, 1111
Carthamus tinctorius
Phytophthora blight in, resistance to, 471
Phytophthora resistance in, chemical nature of, 667
rust of, spore germination in, 436
Carver, R. B., (806)
Carya illinoensis, zonate leaf spot on, 758
cassava (see **Manihot utillissima**)
Cassia surattensis, Cephalosporium sp. for biological control, 793
Castaño-Z., J., (758)
catalase (see **enzymes**, specific)
Cattleya sp., mosaic virus of, ultrastructure, 762
cauliflower mosaic virus
aphid transmission of, 805
acquisition factor, 782
on Datura stramonium, local lesion host, **1473**, **1474**
Cephalosporium sp., for biological control of Cassia surattensis, in Hawaii, 793
gramineum
medium for isolation, 783
on wheat, symptoms on seedlings, 1013
gregatum
on soybean
criteria for evaluating resistance, 1112
etiology of, 345
factors affecting stem rot of, 1334
photoperiod influence, 782
relation to soybean mosaic virus, 1314
on soybean straw, recovery of, 1362
Cephalosporium wilt disease, of trees, benomyl for, 807
Ceratobasidium sp., strawberry root rot caused by, pathology of, 700, **701**, **703**
Ceratocystis spp.
canker of aspen associated with, 213, **214**, **217**, **218**
growth of, temp effects, 499
insect transmission of, in aspen, 221
fagacearum
biological control of, in Arkansas, 792
on red oak, benomyl for, **761**
ulmi
aggressiveness in, 939
effect on host physiology, 457
in elm
fine structure of, 1253, **1254**
movement inhibited, 750
physiological changes, 909
sex vs. compatibility, 495
sporulation of, inhibited by fluorophenylalanine, 493
on Ulmus spp., hybrids resistant to, 845
Ulmus pumila × rubra hybrids, response of, 848
Cercospora spp., new spp. on Ligustrum japonicum, 806
arachidicola
on peanut
control, 12
epidemiology of, affected by benomyl, 1029
beticola
on sugar beet
isolate variation on, 134
morphological factors for resistance to, 1095
spore release on, 570
coffeicola, effect of copper fungicides on, 790
kikuchii, on soybean, plant age factor, 771
nicotianae
on tobacco
effect on leaf chemicals, 1392
resistance to, 672
Cercosporella herpotrichoides, on wheat, disease spread by, 1105
Chadha, K. C., (1424)
Chamberlain, D. W., 645
Chaplin, J. F., (1392)
Chapman, W. H., (414), (682)
Charudattan, R., 230, 750
Chatrath, M. S., 1410
chemotherapy, for aster yellows, tetracycline for, 111, **113**
Chen, C.-C., (745)
Chen, M., 663
Chen, T. A., (501)
Chenopodium, potato cork virus indicator, 12
cherry (see also **Prunus spp.**)
internal browning vs. fungus decay, 579
cherry leaf roll virus, properties of, 796
cherry raspleaf virus, host range, 763
Chessin, M., 97, (1103)
chitin, in soil, effect on Rhizoctonia, 595
chloroneb (see **fungicides**, specific)
chlorotic leaf spot virus, in apple, relation to stem-grooving virus, transmission of, 585

Chou, L. G., 750, 1107
Christensen, T. G., 493
Christenson, J. A., 1101
chrysanthemum
bacterial wilt of, nitroheterocyclic bactericide for, 764
Fusarium wilt of, chemotherapeutants for, 756
chrysanthemum chlorotic mottle, light effect on symptoms of, 765
Chrysanthemum morifolium
chlorotic mottle on, light effect on symptoms, 765
effects of peroxyacetyl nitrate on cultivars of, 494
index plant for hydrogen chloride, 427
Mycosphaerella ligulicola on stems of, factors affecting, 1195
chrysanthemum stunt, a viroid disease, 754
Chuaiprasit, C., 1102
Citrullus lanatus, angular leaf spot of, bacterial, 542
citrus (see also **orange**)
Armillaria root rot of, Trichoderma vs. methyl bromide, 781
Phytophthora citrophthora on, respiration patterns, 932
postharvest decay of, benomyl for, 793
red algal disease of, 11
stubborn disease of
diagnosis of, 749
mycoplasmalike organism associated, 729, **730**, 1102
stunting of, endomycorrhizal relations to, 769
tristeza virus & mycoplasmalike organism on, 663, **664**, **665**
volatile compounds from fruits of, effect on Penicillium spores, 488
citrus exocortis, potato spindle tuber agent compared to, 790
citrus greasy spot, histopathology of, on host, cause, 260, **261**
Citrus spp.
benomyl for, persistence in, 748
endomycorrhizae in, seedlings stunted by absence of, 1447, **1448**, **1450**
melanose of, chemical control, 757
stubborn disease of, mycoplasmalike factors affecting, 758
limon, Phytophthora citrophthora on, postinfection changes in chemicals, 1361
sinensis, Mycosphaerella citri sp. nov. on, histopathology of, 260, **261**
Civerolo, E. L., 529, (671), 750, (1294)
Clark, M. C., (790)
Clark, R. L., 750
Claviceps sp., sclerotia of, longevity, 750
purpurea, fungicides for ascocarp suppression, 609
Clayton, C. N., (1369)
clover, red- (see **Trifolium** pratense)
clover, white- (see **Trifolium** repens)
clover club-leaf, possible rickettsial disease of plants, 1112
clover phyllody agent
on aster
chemical & leafhopper effect on, 377
oxytetracycline related to, 50
club root of cabbage, nematode relationships, 1104
Coakley, S. M., 751
Cochliobolus
heterostrophus (see also **Helminthosporium** maydis) on corn, perithecial formation in, 772
lunata, on sugarcane seedlings, control for, 120, **121**
cocoa yellow mosaic virus, host range & properties, 125
coconut
lethal yellowing
in Florida, 788
mycoplasmalike bodies in, 298, **299**
new outbreak, 499
Cohen, E., 932, 1361
Cohen, Y., 751
Colbaugh, P. F., 751
Cole, H., Jr., (580)
Cole, R. J., (752)
Colladonus montanus, vector of Western X-disease, temp effects, 452
Colletotrichum
coccodes
medium for assay, in soil, 1288
on tomato, resistance to, 660, **661**
dematium, on tomato, resistance to, 660, **661**
destructivum, on tomato, from tobacco, resistance to, 660, **661**
fragariae
on strawberry, fruit rot of, 600
on tomato, from strawberry, resistance to, 660, **661**
gloeosporioides
on avocado fruit, latent infection, 592, **593**
on mango, copper for, 777
graminicola, on corn, pathogenicity & host range, 808
lindemuthianum
bean cultivars resistant to, races of, 756
endopolygalacturonase from, inhibited by plant protein, 744
endopolygalacturonase inhibitor nonspecific to, 757
protease from, purification of, 785
Collins, R. J., 802
Colt, W. M., 751
common bean mosaic virus, new strain of, 667
Comstock, J. C., 751, 1107
Comstock, V., (800)
Conroy, J. J., 362
Converse, R. H., 752, 1001
Cook, A. A., 752, (791), (882)
Cook, G. E., 1107
Cook, R. J., (86), (193), (1148)
Cooper, G. R., (776)
Coplin, D. L., 1107
copper sulfate (see **fungicides**, specific)
Coppolino, J. B., (501)
Corbett, M. K., 668, (670)
Cordia goeldiana, decay resistance of, in Brazil, 784
corn
Cochliobolus heterostrophus on, perithecial formation, 772
Colletotrichum graminicola on, host range & pathogenicity, 808
corn stunt of, electron microscopy in, 672
Curvularia leaf spot of, in Venezuela, 12
downy mildew of
chloroneb for control of, 500
flower & seed infection, 817, **818**
Fusarium moniliforme on kernels of, high lysine hybrids, 781
Gloeocercospora sorghi on, in Venezuela, 775
Helminthosporium maydis on
ear rot related to secondary infection & aflatoxins, 1367
effect on electrolyte leakage, 751
factors affecting infection, 671
temp effect, 770
ultrastructure in, 747
Helminthosporium turcicum on, 11
infection rate, 746
maize dwarf mosaic virus in, concentration in hybrids, 640
mycoplasmalike organism in, helical filaments of, 494

Phyllosticta maydis on, host-specific toxin from, 799
stalk rot of, by Fusarium spp., 493
viruslike particles in, relation to stunt, 748
yield of, affected by ozone, 683
corn stunt disease
epidemic simulated, 786
mycoplasmalike organism associated, 752
Corynebacterium
insidiosum
on alfalfa
antigen vs. disease, 1351
resistance induced by avirulent cells, 555
michiganense
bacteriophages for, 755
on tomato
factors affecting disease, 757
resistance to, 756
virulence on Lycopersicon spp., 1082
cotton
antigens of, common to Fusarium & Verticillium, 230
Diplodia gossypina on
biochemical factors affecting, 460
factors affecting, 805
temp & injury effect, 1223
fibers of, discolored by bacteria, 940
Fusarium boll rot of, histopathology, 1381, **1385**
nematode-fungus interaction on, 336
Phakospora gossypii on, in Venezuela, 775
Phymatotrichum omnivorum on, survival affected by temp & moisture, 828
Pythium root rot of, soil factors affecting, 373
root knot of, after sod, 785
seed deterioration by fungi in fields, 1137
Thiabendazole translocation in, 1410
Verticillium albo-atrum
inoculum density relation, 901
microsclerotia in soil, 715
resistance to, 798
vergosin & hemigossypol produced in, 1398
Verticillium dahliae in, role of propagules, 754
Verticillium wilt of
relation to weed control, 582
role of endopolygalacturonase, 498
wilt resistance in, role of phytoalexins, 1402
zonate leaf spot of, 758
Couch, H. B., (669)
Couch, R., 802
Cowden, R. E., (781)
Cowling, E. B., (747)
cowpea (see **Vigna sinensis**)
cowpea chlorotic mottle virus
on cowpea, Mn effects on, 1206
transmission related to particle number, 1283
cowpea mosaic virus
aspartate transcarbamylase activity in host, 1109
electrophoretic mutant of, 777
multiplication affected by protein & nucleic acid inhibitors, 1108
Coyier, D. L., 1102
Crane, J. L., (926)
Criconemoides
curvatum, feeding apparatus of, ultrastructure, 501
onoensis, in rice, nematicide-weed interaction, 764
xenoplax, peach cankers affected by, 774
Crill, J. P., (1085)
Cristulariella pyramidalis, on silver maple, transmission to pecan & other hosts, 758
Cronartium
comandrae, basidiospore germination in, in nature, 389
fusiforme
axenic culture of, 1417, **1418**
geographic variation in, 790
on pine
compared with C. quercuum, 767
effect of fertilizer on, 788
factors affecting, 747
ribicola
on pine, influence on host solute concentration, 226
on Pinus monticola, racial variation in, 777
Crosby, F. L., (1029)
Cross, C., (805)
Crosse, J. E., 176
cucumber, effect of fluoride on pollen & fruit of, 1247
cucumber mosaic virus
peanut stunt virus relationship to, 793
transmission related to particle number, 1283
Cucumis spp., powdery mildew of, spore release in, 1099
Cummins, J. N., (743)
Curl, E. A., (422)
curly top virus
in leafhoppers, feeding injuries to tomato seedlings, 183, **185**
on sugar beet, method for mechanically transmitting virus, 1217
on tomato
Ca uptake & transport affected by, 43
phosphorus effects on, 524
resistance factor in, 954
resistance to, analysis, 564
unusual symptoms in, 187, **188**
Curtis, C. R., 668, 752
Curvularia
maculans, on corn, 12
senegalensis, on sugarcane seedlings, in Hawaii, control for, 120, **121**
Cutler, H. G., 752
cyanamide (see **fungicides**, specific)
cycloheximide (see **fungicides**, specific)
Cylindrocladium spp.
microsclerotial formation in azalea, 772
in soil, azalea leaf trap for isolation of, 736
on Thea sinensis seed, 12
clavatum sp. n., on Araucaria, Eucalyptus, & Pinus, in Brazil, 898, [*32*]
floridanum, pathogenicity of, on peach & lupine vs. Calonectria spp., 485
scoparium, on azalea, pathogenicity compared to Calonectria, 647
Cymbidium mosaic virus, on Cattleya flowers, 762

Daft, G. C., 57, 1167
Daly, J. M., 392
Damann, K. E., Jr., 752
Damsteegt, V. D., 668
Darley, E. F., (567)
Darluca filum, mycoparasite on Puccinia recondita, 931
dasheen mosaic virus, in aroids, in Florida, 804
Datura stramonium, cauliflower mosaic virus on, local lesion host, **1473**, **1474**
Davidson, R. M., Jr., 1040
Davis, D. D., 14
Davis, E., (795)
Davis, P. L., 488
Davis, R. E., 494, (672), 753
Dawson, W. O., 753, 1206
Day, P. R., 494, 753, (1005)
Deal, D. R., 172, 503
DeBauer, L. I., 753, (773)
Decker, P., 305

DeGroot, R. C., 753
Demos, J. H., (673)
Demyers, D. P., 753
Dendroctonus terebrans, on pine, association with Fomes, 670
Dendrophoma obscurans, on strawberry, symptoms, 804
Denmark, J. C., (801)
deoxyribonuclease (see **enzymes**, specific)
deoxyribonucleic acid, homologies in bacteria, 759
Derr, H. J., 325
Derrick, K. S., 753
Desmodium yellow mottle virus, host range, 125
Deuterophoma tracheiphila, on lemon, fungicides for, bioassays of, 1007, **1008**
DeVay, J. E., (230), 754
deZoeten, G. A., (195), 754, 1018
Dhingra, O. D., 1108, (1261)
Diachun, S., 754
Dianthus caryophyllus (see also **carnation**)
carnation mottle virus of, properties & RNA, 959, **961**
Diaporthe phaseolorum sojae, on soybean, relation to Sclerotinia sclerotiorum, seed infection, 1261
Diaz, A. J., 754
Diaz Polanco, C., 11
2,6-dichloro-4-nitroaniline (see **fungicides**, specific)
Dickey, R. S., (329), (1120)
dicofol, acaricide, effect on cotton wilt, 780
Diener, T. O., 754
Difolatan (see **fungicides**, specific)
Dimock, A. W., (765), (1188), (1195)
Dimond, A. E., 494, (501)
Dinus, R. J., (790)
Diplocarpon rosae, viruslike particles from, 493
Diplodia
gossypina
in cotton
biochemical factors affecting, 460
factors affecting boll invasion, 805
role of temp & injury on, 1223
natalensis
on orange, benomyl for, 1434
o-phenylphenol toxic to, 756
Ditylenchus dipsaci
on alfalfa
relation to Meloidogyne hapla, 1103
temp relation, 761
in peas, peroxidase & phenols in, 779
Dixon, J. B., (777)
DMSO (see **fungicides**, specific)
dodine
tolerance to, in Venturia inaequalis, 496
Venturia inaequalis ascospore reaction to, 782
Dodman, R. L., (278)
Dorylaimus sp., methyl bromide fumigation for, 191
Dothiostroma pini, on Scotch pine, first report, 671
Douglas fir (see **Pseudotosuga menziesii**)
Doupnik, B., Jr., (752), 802, 1367
Dowler, W. M., (745), 754
Dowling, C. F., (499)
Drake, C. R., (667), 668, (669), (1366)
Drechslera
hawaiiensis, on sugarcane seedlings, in Hawaii, control for, 120, **121**
oryzae, detection on rice seed, by ultraviolet light, 1102
rostrata, on sugarcane seedlings, control for, 120, **121**
Driver, C. H., (1104), (1105)
Drummond, D. B., 494
Duafala, T., 755
Dubin, H. J., 755
Duda, C., (789)
Dueck, J., 964
Duffus, J. E., 161, (1141), 1274
Dukes, P. D., 755
Dunkle, L. D., (760), (1110)
Durbin, R. D., 755
Dutch elm disease
effect on host physiology, 457
resistance to, anatomical marker, 789

Easton, C. Z., 755
Easton, G. D., 520
Echandi, E., 755, (757)
Echinodorus brevipedicellatus, Aphanomyces sp. on, symptoms of, 806
Eckert, J. W., (239), 756
Edgington, L. V., (500), (513)
Eichhornia crassipes, Fusarium roseum pathogenic to, in Florida, 806
electron microscopy (see also **ultrastructure**)
African maize streak, 671
alfalfa mosaic virus, in leaves, 798
cactus virus, 739
carnation etched ring virus, 810, **811**
cauliflower mosaic virus, on Datura stramonium, **1473**, **1474**
corn stunt, 672
helical filaments in, 494
Desmodium yellow mottle virus, properties, 125, **127**
elm phloem necrosis, mycoplasmalike bodies in, 140, **141**, **142**
Erwina amylovora, aerial strands of, 355, **358**, **359**
Meloidogyne hapla, on alfalfa, 792
mycoplasmalike bodies, in coconut, 298, **299**
peach X-disease, mycoplasmalike bodies in, 935, **936**
peanut mottle virus, 832, **837**
Phytophthora megasperma sojae, on soybean, 670
potato virus M, on kidney bean, 77, **79**, **82**, **84**
preparation techniques, 770
procedures for use, 749
Prunus necrotic ringspot virus, 529
Pseudomonas pisi, on tobacco leaf tissue, 1327, **1328–1330**
radish mosaic virus, in cytoplasm, 448, **449–451**
rhabdoviruslike particles associated with strawberry crinkle virus, **491**
sowthistle yellow vein virus, techniques, 770
soybean mosaic & bean pod mottle viruses, 839, **841**, **843**
stubborn disease of citrus, 729, **730**
sugarcane xylem, 498
TMV, on potato, virus morphology & host cytological response, 1303, **1305–1310**
tobacco ringspot virus, ash strain of, 1023, **1027**
tristeza vs. mycoplasma, on citrus leaves, 663, **664**, **665**
viruses, immuno-specific grids for, 753
viruslike particles in
mosaic-diseased raspberries, in France, **1477**
Penicillium, 668
witches'-broom of
sweet potato, 903, **907**
willow, 826, **827**
Elgersma, D. M., (745), 1232, (1256)
El-Goorani, M. A., (294)
ellagitannins, effect on wood-rotting fungi in oak, 620
Ellerbrock, L. A., 494
Ellingboe, A. H., 401, (708), (791), (876), (1210), (1219)
Ellis, D. E., 1227
Elliston, J. E., 756
elm mosaic virus, characterization of, in Iowa, 987, **988**, **991**
elm phloem necrosis, mycoplasmalike bodies associated with, 140

Emge, R. G., 668
Emmatty, D. A., 756
Endo, R. M., (751)
Encogone sp.
on grape roots, replant disease, 172, **174**
on peanut, factors affecting, 783
on soybean, relation to Phytophthora rot, 896
mosseae
on citrus, relation to fumigated soils, 769
citrus seedlings stunted by absence of, 1447, **1448**, **1450**
endomycorrhiza, on citrus seedlings, stunting from absence of, 1447, **1448**, **1450**
endopolygalacturonase (see **enzymes**, specific)
Engelhard, A. W., 11, 756
Englander, L., 1102
English, W. H., (755), (774)
Entyloma sp., on bean, in Central America, 794
enzymes (general) (see also **enzymes**, specific)
cellulolytic & pectolytic, from Helminthosporium maydis, 1108
cell wall-degrading, by Xanthomonas spp., 779
extracellular-, relation to snow mold pathogens, 1105
Fusarium wilt of tomato, affected by, 651
halo blight of bean, cell wall degradation in, 775
potato virus X proteins affected by, 1154
relation to Erwinia carotovora mutants, 746
in rice, inhibited by sulfides, 634
role in soft rot of potato, 747
soybean hypocotyl response to Phytophthora infection, 781
enzymes (specific) (see also **enzymes**, general)
catalase, activity in strains of Pseudomonas solanacearum, 294
deoxyribonuclease, digestion of nucleic acids in carnation etched ring virus, 810
endopolygalacturonase
inhibited by plant proteins, 774
nonspecific to Colletotrichum lindemuthianum, 757
esterase, detection in Venturia inaequalis, histochemical, 1242, **1244**
formamide hydro-lyase, from Stemphylium loti, 758
fructofuranosidase, induced by Pseudomonas savastanoi, 349
galactosidase, by Sclerotium rolfsii, 767
glucosidase
Fusarium wilt of tomato, vascular browning, 796
from Phoma strasseri, 1104
pectic-, role in potato soft rot, 747
peroxidase
IAA activity of, chemicals affecting, 798
vs. phenols, relation to nematode on peas, 779
in wood-rotting fungi, role of H_2O_2, 100
phenolase, in tomato, Fusarium wilt of, 651
phosphatidase, effect on Erwinia carotovora virulence, 746
protease, from Colletotrichum lindemuthianum, purification of, 785
epidemiology
Armillaria root rot of peach, 567
bacterial blight of soybean, 57
blister rust of pine, 389
Botrytis blight of macadamia racemes, 316
cactus virus on wild plants, 97
Ceratocystis canker of aspen, 213
Cercospora beticola on sugar beet, 570
Cercospora leaf spot on peanut, benomyl for, 1029
corn stunt, simulation, 786
Fomes annosus, microclimate effect on basidiospore release, 319
foot rot of wheat, 1105
Helminthosporium maydis, on corn, 671, 749
peanut rust, in Texas, 794
pear to Erwinia amylovora, medium for monitoring populations, 1175
Puccinia graminis tritici, in Africa, 166
rice panicle blast, predicting outbreaks of, 1126
rust spore dispersal, gradients, 70
Sclerotinia sclerotiorum on beans, in Nebraska, 1107
stripe rust of wheat, in Oregon, 668
sunflower downy mildew, 751
Verticillium albo-atrum, inoculum density relation, 901
wheat stem rust, models, 775
Epstein, A. H., (987)
Ercolani, G. L., 756, (762)
ergot (see **Claviceps sp.**)
Eriobotrya japonica
bacterial stem canker of, 310
scab of, cross inoculations, 914
Erwin, D. C., (1398), (1402)
Erwinia spp.
avirulent spp., pear fire blight affected by, 777
DNA homologies in, 759
inhibition by corn fraction, 803
medium for isolation, 778
ribosomal proteins of, gel electrophoresis in, 1077
amylovora
aerial strands of, affected by pesticide oil, 355, **357**
on apple, predisposing factors in, 176, **178**
on pear
epidemic population monitored with selective medium, 1175
N & K effect on, 768
severity measured, 795
recovery from symptomless apple & pear trees, 39
streptomycin resistant strains of, in California, 779, [*31*]
on tobacco, induced hypersensitivity
in leaves, protein changes, 1428
protein structure of, 766
aroideae, on tomato, cultivars tolerant to, 1085
carotovora
E. atroseptica compared to, immunodiffusion & immunoelectrophoresis, 1110
mutants of, role of enzymes in, 746
on potato, role of pectic enzymes, 747
on potato tubers, soil factors, 747
rubrifaciens, on tobacco, hypersensitivity induced in, 759
Erysiphaceae, agricultural effect on incidence of, 799, [*32*]
Erysiphe
cichoracearum, on Pentstemon, spore release in, 1099
graminis
appressoria of, related to cuticle, 708, **712**
benzimidazole-resistant strain of, 795
genetics vs. physiology in, symposium, 401
graminis hordei
on barley, effect of ozone on, 1144
mitosis in, 777
secondary hyphae formation & gene segregation in, 1219
secondary hyphae in primary infection, 876
graminis tritici, S^{35} uptake by wheat, during infection, 791
polygoni, on Lathyrus, spore release in, 1099
esterase (see **enzymes**, specific)
Esuruoso, O. F., (756)
Etherton, B., (501)
Eucalyptus spp.
Oidium sp. on, spore release in, 1099
Phytophthora cinnamomi on, in Australia, 972, **973**, **974**

saligna, new root disease of, in Brazil, 898, [32]
Eversmeyer, M.G., (944), (947), (1109)

Faccioli, G., (43), 524
false broomrape, on sweet potato, cultivar reaction, 755
Farley, J. D., 1288
Feder, W. A., (495), (497)
Feng, N. I., 494
Ferris, J. M., (362)
Filer, T. H., Jr., 756
Findley, W. R., (774)
fire blight (see **Erwinia** amylovora)
Fisher, F. E., 11, 757
Fisher, M., 757
flax
Melampsora lini resistance genes for, 800
rust fungus of, RNA synthesis changes in, 1106
Flentje, N. T., (1057)
Flowers, R. A., 474, 757
fluorophenylalanine, sporulation of Ceratocystis inhibited by, 493
Fomes annosus
basidiospore release from, climatic factors, 319
cultural practices & soil factors affecting, 422
isolation methods in, 667
on pine
association with beetle, 670
soil factors affecting, 743
stump infection by, chemicals for, 1105
ultrastructure of, 762
Ford, R. E., (366), (764), 987, (1108), (1466)
formamide hydro-lyase (see **enzymes**, specific)
Forrester, L. L., (754)
Forster, R. L., 757
Foudin, A. S., 802, 1032
Fox, J. A., (673), (778)
Foxe, M. J., (788)
Fragaria ananassa (see **strawberry**)
Frank, Z. R., 1331
Fraxinus americana, tobacco ringspot virus of, 1023, **1024**, **1027**
Frazier, N. W., (491)
Frederick, R. J., (111)
Frederiksen, R. A., 757, (817)
Freeman, T. E., (806)
French, E. R., (12), 757
French, R. C., 116
French, W. J., 758
Fries, R. E., (1109)
Frosheiser, F. I., (798)
fructofuranosidase (see **enzymes**, specific)
Fry, W. E., 758
Fucikovsky, L., 758, (779)
Fudl-Allah, A. E. A., 729, 758, 1102
Fujisawa, I., 810
fungicides (general) (see also **fungicides**, specific)
apothecial suppression, in Gloeotinia temulenta, 605
for ascocarp suppression in ergot, 609
bioassays of, on lemon, 1007
for black spot of rose, control, 803
Cercospora leaf spot of peanut, 1029
citrus melanose controlled by, 757
copper-, for mango anthracnose, 777
drenches used at various soil depths, for Phytophthora control, 793
Fusarium oxysporum metabolism affected by, 793
Helminthosporium spp., tolerance to, 497
histone effect on trichloromethyl sulfenyl, 802
leaf microflora & brown spot relation on tobacco, 916
mercury in
barley from seed treatment, 766
sweet potato roots from fungicides, 804
mycoflora incidence in pecan kernels affected by, 792
nonmercurial, for snow mold, 746
peach fruit penetrated by, 784
for peanut leaf spot control, 12
for peanut rust control, 803
phytoalexin induced by, in soybean, 1113
for postharvest decay of
apple, 746
peaches & nectarines, 129
protective- & systemic-, for Botrytis leaf blight of onion, 773
Rhizoctonia blight of Carissa, 801
for Rhizoctonia of Gynura & Hoya, 769
soil-, for control of rice blast, 758
soil-borne plant pathogens identified by, 287
soil factors affecting, in cotton root rot, 373
for sooty blotch of apple, 668
spray schedule for tomato blight, 11
for stump infection in hemlock, 1105
systemic-, to reduce ozone injury in bean, 580
transcuticular movement of, method, 500
fungicides (specific) (see also **fungicides**, general)
benomyl
bioassay on Deuterophoma tracheiphila, 1007
for blind seed disease of Lolium, 605
for Cephalosporium wilt of oak & elm, 807
on cotton, translocation in, 796
effect on
growth of 9 plant spp., 499
yeast, 699
for Fusarium wilt on mimosa, 744
for juniper blight, 806
metabolic fate in pea, 630
movement & retention in sugar beets, 1111
movement in soil, surfactant effects, 513
oak wilt controlled by, 761
on orange
application & persistence in fruit of, 1434
persistence in, 748
orange postharvest decay, 793
for ozone injury to bean, 580
for postharvest decay of peaches & nectarines, 129
for Sclerotinia sclerotiorum in cabbage, 1102
for snow mold on turf, 760
for sooty blotch of apple, 668
on strawberry, translocation in, 1183, [32]
uptake of, in sycamore & oak, 807
for Ustilago striiformis, on Agrostis, 533
benzimidazole
mildew resistant strain to, 795
for ozone injury to bean, 580
carboxin, bioassay on Deuterophoma tracheiphila, 1007
chloroneb, degradation & synthesis by soil microorganisms, 1112
copper sulfate, for apple canker, 755
cyanamide, for Sclerotinia sclerotiorum in cabbage, 1102
cycloheximide, bioassay on Deuterophoma tracheiphila, 1007
2,6-dichloro-4-nitroaniline
microbial metabolism by, 794
for postharvest decay of peaches & nectarines, 129
Difolatan, for apple canker, 755
DMSO, effect on aflatoxin in soybean, 753
methyl 2-benzimidazolecarbamate, metabolic fate in strawberry, 789
methylisothiocyanate, Thielaviopsis basicola, spore survival affected by, 417

parinol, for blind seed disease of Lolium, 605
PCNB, nature of control in soil, 385
phenylmercuric acetate, for apple scab control, 791
sodium N-methyldithiocarbamate, Thielaviopsis basicola, spore survival affected by, 417
Thiabendazole
bioassay on Deuterophoma tracheiphila, 1007
for Fusarium storage rot of squash, 758
movement & retention in sugar beets, 1111
for ozone injury to bean, 580
sweet potato stem rot control, 776
translocation in cotton plants, 1410
thiophanate-methyl, for stone fruit brown rot blossom blight, 781
triarimol
action of, in corn smut, 671
for apple rot control, 669
for apple scab control, 791
for juniper blight, 806
for sooty blotch of apple, 668
triphenyltin acetate, for blind seed disease of Lolium, 605
fungistasis
Aspergillus in peanut rhizosphere, 1387
inhibitor from alkaline soil, nature of, 573
mechanism for inhibition of, 1107
Thielaviopsis basicola, rhizosphere acids affecting, 688
volatile factor in soil
extraction of, 1475
properties of, 602
Fusarium spp.
antigens of, common to cotton varieties, 230
chlamydospore formation in, model systems for, 766
corn stalk rot caused by, 493
on cotton bolls, 4 spp. in, 1381, **1383**
in grassland plants, potential pathogens, 1066
moniliforme
on corn kernels, high lysine hybrids, 781
metabolite from, toxic effect, 752
on soybean, pathogenicity doubtful, 801
moniliforme subglutinans, on sorghum, symptoms of, 800
nivale
on bentgrass, benomyl for, 761
extracellular enzyme relationships of, 1105
in turf, fungicides for, 746
on wheat, effect of fall clipping, 1108
oxysporum
chlamydospore germination of, in soil, 273, **275**
on Douglas-fir seedlings, strains of, 481
heterokaryosis in, on tomato, 771
metabolism of, affected by fungicides, 793
on tomato
soil nutrients affecting, 799
vascular browning vs. glucosidase, 796
on watermelon, nematodes vs. crop sequence, 791
oxysporum batatas, on sweet potato, Thiabendazole for, 776
oxysporum cepae, ecology & pathology of, 870, **874**
oxysporum chrysanthemi, chemotherapeutants for control, 756
oxysporum conglutinans, on Brassica campestris, interaction with turnip mosaic virus, 1424
oxysporum dianthi, on carnation, histopathology of, 782, 1318, **1320–1324**
oxysporum lycopersici
microbodies in hyphae of, ultrastructure, 673, 1045, **1046, 1048–1050**
on near-isogenic tomato lines, growth in, 1232
on tomato
genetics of, 745
histochemistry of browning, 651, **652**, 774
race 1, 743
single gene resistance related to localized infection, 1256, **1258**
Woronin bodies of, ultrastructure, 797
oxysporum niveum, on watermelon, inoculum density effect, 807
oxysporum perniciosum, on mimosa, benomyl for, 744
oxysporum pisi, pea infection sites of race 5, 1419
oxysporum vasinfectum
enzyme production by, C & N sources for, 501
Pratylenchus brachyurus related to, on cotton, 336
spore germination inhibited by capsidiol & cepsenone, 1186
roseum
on bluegrass, relation to Tylenchorhynchus dubius, 1311, **1312, 1313**
on carnation, antagonistic soil bacteria on, 1052, **1053, 1055**
on Eichhornia crassipes, in Florida, 806
on squash, storage rot control by Thiabendazole, 758
zearalenone inhibited in, relation to perithecium production, 937
roseum cerealis, Culmorum, NH_3 effect on, in soil, 86
solani
chlamydospore formation in, role of organic C, 1148, **1149**
on peanut, role with Pythium myriotylum on pod rot, 1331
pisatin induction by, in pea, 1101
solani phaseoli
on bean, soil factors affecting, 1101
phaseollin alteration by, 794
soil factors affecting, 550
subsoiling to reduce root rot, 306, **308**
solani pisi
chlamydospore germination near pea seed, 1111
host for, perfect stage of, 731, **733**
NH_3 effect on, in soil, 86
Fusicladium
effusum, spore dissemination in, humidity effects, 805
photinicola, Spilocaea eriobotryae compared to, 914

Gaard, G., (754)
Gabrielson, R. L., (287), 758, 1102
galactosidase (see **enzymes**, specific)
Gallimore, M. D., (116)
Galvez-E., G. E., 758
Gamez, R., 759
Garber, E. D., (746)
Gardner, D. E., 183, 187
Gardner, J. M., 759
Gardner, M. W., (799), (914)
Gardner, W. S. 759
Garraway, M. O., (1111)
Garren, K. H., (669), 759
Gay, J. D., 803
Geissinger, C. M., (765)
genetics (see also **resistance**)
Ceratocystis ulmi, sex vs. compatibility, 495
Erysiphe graminis, relation to physiology, symposium, 401
Fusarium oxysporum, heterokaryosis of, 771
Heterodera solanacearum, in tobacco, 778
Phytophthora capsici, strains of, 20, **24**
Podosphaera leucotricha, heterothallism in, 1102
Puccinia graminis tritici, symposium, 392
Rhizoctonia solani, heterocaryons of, 748
Thanatephorus cucumeris, heterokaryosis in, 1057, **1058, 1060**

Ustilago maydis
extranuclear, 753
heterokaryon transfer of killer factor, 494
Verticillium spp., variability in, diploidization effects, symposium, 407
wheat to leaf rust, 866
Gengenbach, B. G., (1107)
George, A. G., (715), (901)
Gerdemann, J. W., (769), (1447)
Gibbs, J. N., (939)
Gill, D. L., (806)
Gillaspie, A. G., Jr., 760, (769)
Gilmer, R. M., 478, 495, (501), 585
Gingery, R. E., (760)
Ginkgo biloba, phytoalexin production from, 493
Giri, L., 1103
Gleditsia triacanthos, Kaskaskia gleditsiae gen. et sp. nov. on, 926, **927–929**
Glenn, W. K., Jr., 803
Gloeocercospora sorghi, on corn, in Venezuela, 775
Gloeosporium sp., blueberry decay from stages of, 68
Gloeotinia temulenta, apothecial formation in, fungicides against, 605
Glomerella cingulata
on apple, control by triarimol, 669
on Betula & Malus, reciprocal pathogenicity, 1366
on Camellia spp., resistant sources of, 806
on tomato, from apple, resistance to, 660, **661**
glucosidase (see **enzymes**, specific)
Glycine max (see **soybean**)
Goenaga, A., (493)
Gold, A. H., (43), (524), 760
Golden, J. K., 819
Gong, C., 760
Gonzalez, L. C., 760, (1093)
Gooding, G. V., Jr., 803
Goodman, R. N., (176), 760, (766), (780), 1327, (1428)
Gordon, D. T., 760
Goss, R. L., (761)
Gossypium hirsutum (see **cotton**)
Gough, F. J., (785)
Gould, C. J., 761
grain storage fungi, propionic & acetic acids for control, 787
Granett, A. L., 495, 761
Granillo, C. R., 669
grape, vesicular-arbuscular mycorrhiza on roots of, 172, **174**
grape replant failure, biotic relationships of, 503
Gray, L. E., (345), 1362
Green, R. J., Jr., (362)
Gregory, G. F., 761
Griffin, G. D., 761, 1103
Griffin, G. J., 669, 1387
Grogan, R. G., (782)
Groth, J. V., (1057)
Gudauskas, R. T., (802), (805)
Gumpf, D. J., (781)
Gunasekaran, M., (797)
Gustafson, H. L., (743)
Guttman, S., (763)
Gymnosporangium juniperi-virginianae, pathogenic variation in, 493
Gynura aurantiaca
latent virus of, assay extraction & transmission in, 1105
Rhizoctonia cutting rot of, fungicides for, 769
virus of, characterization, 781

Haas, J. H., 761
Haberlach, G. T., (1439)
Hacskaylo, E., (777)
Hadwiger, L. A., 761, (1101), (1106)
Hagedorn, D. J., (678), 762, (786)
Haglund, W. A., 287, (1419)
Hall, C. B., (882)
Hall, D. H., (750)
Halliwell, R. S., 762, (786)
Hamblen, M. L., 762
Hameed, K. M., 669
Hamilton, R. I., (387)
Hammerschlag, F., (719)
Hammerschlag, R. S., 669
Hampton, R. O., 268, (1104)
Hanchey, P., (755), 762
Hancock, J. G., 762, (775)
Hankin, L., (747), (998)
Hankins, B. J., (1108)
Hanlin, R. T., 762
Hansbrough, J. R., 681
Hansen, A. J., 763
Hanson, R. S., (1107)
Harder, D. E., 166
Hardison, J. R., 605, 609
Harman, G. E., 206, 209, (495)
Harrison, A. L., (794), 803
Harrison, B. H., 495
Hart, J. H., 620, (909)
Hartman, J. R., 803
Hartman, R. D., 804
Hass, B., (770)
Heagle, A. S., 683, 763, 1144
Hearon, S., (903)
Heath, M. C., 27, 763
Hebeloma sarcophyllum, fatty acids & sterols from, 777
Hebert, T. T., (832)
Helgeson, J. P., 1439
Helianthus annuus
bacteria in head of, insect vector for, 758
bacteriosis of, 779
downy mildew of, relation to IAA, 751
Plasmopara halstedii on, role of zoosporangia, 751
Verticillium wilt of, losses from, 764
Helicotylenchus nanus, relation to club root of cabbage, 1104
Helminthosporium spp.
spore germination in, cell-free soil extracts affecting, 805
tolerance to fungicides, 497
erythrospilum, on bentgrass, nutrition effect, 780
maydis (see also **Cochliobolus** heterostrophus)
aflatoxins in, on corn, 802
cellulolytic & pectolytic enzymes from, 1108
on corn leaves, spectral reflectance & transmittance of, 1210
disease determinant of race T from, 968
ear rot from, relation to secondary fungi & aflatoxin contamination, 1367
electrolyte leakage from corn leaves from, 751
epidemiology & survival of, 772
factors affecting infection, 671
infrared photography of epidemic, 804
mesophyll cell changes in, on corn, ultrastructure, 798
overwintering of, in Illinois, 749
races T & O, temp & light effects on, 676
on sorghum, relation to maize dwarf mosaic virus, 802
temp effect, on corn, 770
toxin effect on mitochondria, 798
toxin production by, 772
ultrastructure of
on corn, 747
races O & T, 749

virulence vs. disease incidence, 498
viruslike particles in, 748
sacchari
toxin from
effect on ultrastructure of sugarcane leaf cells, 339, **341, 342**
varietal resistance to, 466
sativa, on bluegrass, drought stress factor, 751
sorokinianum
on Poa pratensis, factors affecting conidial germination, 1133, *[32]*
spore germination, factors affecting, 804
tritici-vulgaris, on wheat, propagules of, 627
turcicum
on clover leaves, phytoalexins from, 235
corn frost sensitivity related to, 794
epidemiology on sweet corn, 11
on sweet corn, 746
victoriae
toxin from
affected by uranyl salts, 755
by electrolyte leakage, purification of, 752
Hendrix, F. F., Jr., (819)
Hendrix, J. W., (474), 763, 1376
Henis, Y., (595), (852)
Hennen, J. F., 763
Henson, L., (754)
Heskett, M. G., (349), (1077)
Hess, S. L., (763)
Hess, W. M., (339), 763, (792)
Heterodera
glycines
on soybean, interaction with Rhizobium japonicum, 1201, **1204**
temp effect on reproduction, 762
schachtii, on sugar beet, relation to Meloidogyne, histopathology, 1103
solanacearum, on tobacco, genetics of, 778
Heteromeles arbutifolia, scab of, cross inoculation, 914
Heybroek, H. M., (939)
Hibben, C. R., 1023
Hibiscus cannabinus & esculentus, zonate leaf spot of, 758
Hickey, K. D., (668), 669
Hickman, C. J., (799)
Higaki, T., (767)
Higgins, V. J., 235, (763)
Hikida, H. R., 764, (784)
Hilborn, M. T., (776), (777)
Hildebrand, D. C., (300)
Hill, J. H., 764
Hillis, W. E., (620), (1407)
Hilty, J. W., 804, (1070)
Himes, W. E., 670
Hinds, T. E., 213, 221
Hine, R. B., (798), (828)
Hinostroza, A. M., 12
Hiruki, C., 77
Hirumi, H., 670, (826)
Hoch, H. C., 149
Hock, W. K., (499)
Hodges, C. F., (533), 1133
Hodges, C. S., 898
Hodgson, W. A., (92)
Hoes, J. A., 764, 1088
Hoff, R. J., (777)
Hoitink, H. A. J., 764
Holcomb, G. E., (744)
Hollis, C. A., (788), 1417
Hollis, J. P., (634), 764
Holmes, F. O., 826
Holmes, F. W., 495, 939
Holmes, L. D., (306), (550)
Honda, Y., 448
Honour, R. C., 765
Hooker, A. L., (968)
Hooper, G. R., 823
Hopkins, D. L., 542, 804
Hora, F. K., (573), (769)
Hora, T. S., 765, 1475
Horn, G. C., (807)
Horner, C. E., (576), (1104)
Horsch, R., (439)
Horst, R. K., 765, (889), (1188)
Horton, B. D., (745)
Hosford, R. M., Jr., 627, 765
Houseworth, L. D., 765
Houston, D. R., 495
Howard, C. M., 600, 804
Hoya carnosa, Rhizoctonia cutting rot of, fungicides for, 769
Hsu, H. T., 765
Hsu, S.-C., 766, 876
Hsu, S.-T., 329, 1120
Huang, J. S., 766, 1428
Huang, P. Y., (766)
Huber, D. M., 434, (1105), 1108
Hubert, J. J., 766
Huisingh, D., 766, 804, (1201)
Huisman, O. C., (744), 766
Humulus lupulus, rod-shaped virus of, characterization & purification of, 1105
Hunt, P., (298)
Hunter, J., 316, 767, (1109)
hydrogen chloride, vegetation effect of, analysis for, 427
hydroxyphaseollin (see **phytoalexin**)
Hylastinus obscurus, on red clover root, preference for, 496
Hypomyces sp., perfect stage for Fusarium solani pisi, 731
Hypoxylon mammatum, host physiological changes induced by, 787

Igwegbe, E. C. K., (729)
insects as vectors (see also **leafhopper** & under genera of)
aphids
for cauliflower mosaic virus, 782, 805
for tobacco mosaic & brome mosaic viruses, 429
bean yellow stipple virus by beetles, 759
for beet yellow stunt on sugar beet & lettuce, 161
for Ceratocystis canker of aspen, 213
for Desmodium yellow mottle virus, 125
leafhoppers, relation to clover phyllody agent on aster, 377
Neotephritis finalis for bacterial blight of sunflower, 758
Schizaphis graminum for barley yellow dwarf virus, 921
for Western X-disease, temp effects, 452
internal rib necrosis, on lettuce, relation to beet western yellows & lettuce mosaic viruses, 1141
Ipomoea batatas (see **sweet potato**)
Irwin, R. D., 1103
Ishizima, T., (494)

Jackson, A. O., 767
Jackson, K. E., (808)
Jafri, A. M., 1103
Jagels, R., (501)
James, W. C., 92
Jares, T. W., (807)
Jatala, P., 1103
Jaworski, C. A., (442), (808)
Jefferson, L., (799)

Jenkins, S. F., Jr., 767
Jensen, D. D., 452
Jensen, H. J., (1103), 1104
Jensen, K. F., (499)
Jensen, S. G., 290, 587
Jewell, F. F., 767
John, C. A., (756)
John, V. T., (776), (1116)
Johnson, A. W., (791)
Johnson, D. R., (668)
Johnson, F., 1104
Johnson, H., (700)
Johnson, J., (762)
Johnson, L. B., (798), (1109)
Johnson, L. F., 767
Johnson, M. L., (349)
Johnson, P. W., (776)
Johnson, R. A., 921
Johnston, S. A., (1201)
Jones, B. L., 817
Jones, E. S., 1229
Jones, J. P., (799)
Jones, R. K., 640, 812
Jones, T. M., 495, 767
Jones, T. W., (761)
Jowett, D., 366
Juniperus sabina tamariscifolia, benomyl & triarimol for blight on, 806

Kado, C. I., (759), 1077
Kahn, R. P., (784), 903
Kais, A. G., 768, (790)
Kaiser, W. J., 768
Kajita, S., 615
Kantzes, J. G., (769)
Kaper, J. M., (959)
Karganilla, A. D., 1373
Kaskaskia gleditsiae, on honey locust, in Illinois, new genus & sp., 926, **927–929**
Katan, J., (852)
Kato, H., (1126)
Kawamoto, S. O., 496, 1263, 1266
Keeling, B. L., 768
Keen, N. T., 439, 768, (781), 1365, (1398), (1402)
Kehr, A. E., (304)
Keil, H. L., 39, 355, (672), 768
Kelley, W. D., 422
Kelman, A., (803)
Kemp, J. D., (1439)
Kennedy, B. W., (964)
Kerr, E. D., (1107)
Khare, M. N., (1108)
Kienholz, O. O., (758)
Kim, S. H., 769
Kim, S. K., 769
Kimbrough, J. W., (1417)
Kincaid, R. R., 302
Kingsland, G. C., 804, 805
Kirkpatrick, B. L., (1183)
Kirksey, J. W., (752)
Klarman, W. L., 670, 719, (745), (1113)
Klein, M., 111, (497)
Kleinschmidt, G. D., 769, 1447
Kleinwort, J., (1108)
Kline, D. M., (766)
Klisiewicz, J. M., 436
Klos, E. J., (799)
Knauss, J. F., 769
Knesek, J. E., (1101), 1104
Knoke, J. K., (748), (774)
Knowles, J. H., (499)
Knutson, D. M., 769
Ko, W. H., 385, 573, (767), 769
Koenigs, J. W., 100
Koike, H., (760), 769
Kommedahl, T., 770, (781)
Koogle, D. L., (670)
Kosuge, T., (349), (794), (800)
Kovacs, M. F., Jr., (688)
Kraft, J. M., (1101)
Krass, C. J., 770
Krause, C. R., (140), 1253
Krebill, R. G., 389
Kress, L. W., 496
Kreutzer, W. A., (797), 1066, (1238)
Kuc, J., (780), (789), (1242)
Kucharek, T. A., (12)
Kulfinski, F. B., 770
Kuhn, C. W., (802)
Kunimoto, R. K., (316), (767)

Lacasse, N. L., (427), (580)
Lactuca sativa
Pythium on roots of, ultrastructural changes in, 751
Lacy, M. L., (282), (1111)
Ladipo, J. L., 195
Laemmlen, F. F., 769, 770
Lai, M., 310, 770
Landis, W. R., 909
Lane, L. C., (767)
Lang, D. S., (770)
Langenberg, W. G., (253), 770, 1214
LaPrade, J. C., 771
Larsen, P. O., 1108
Laseter, J. L., (797)
Lastra, J. R., 771
Latham, A. J., 805
Lathyrus spp., powdery mildew of, spore release in, 1099
Latterell, F. M., 771
Lauchli, A., (1410)
Laughlin, C. W., (1311)
Laviolette, F. A., 771
Lawler, G. C., (797)
Lawson, R. H., (754), (796), (903)
Leach, L. D., 303
leafhopper (see also **insects as vectors** and under genera of)
agallian-, cell monolayer growth, in culture, 776
injury to tomato seedlings from feeding, 183, **185**
Leary, J. V., 771, (785)
Leath, K. T., 496
Leben, C., (57), 674, 771, (1075), (1167)
Lee, C. R., 516
Lee, F. N., (808)
Lee, T. A., Jr., 772
Lee, Y.-S., 839, 887
Leeper, J. C., (817)
legume little leaf, characterization of, 1101
Leonard, K. J., 772
Leone, I. A., (496), (499)
Leptosphaeria avenaria triticea, Pyrenophora trichostoma relation, on wheat, 765
Lesemann, D., (97)
Lester, D. T., 845, 848
lettuce (see **Lactuca sativa**)
lettuce mosaic virus
on lettuce, symptoms of, 751
relation to beet western yellows & internal rib necrosis of lettuce, 1141

Levine, R. G., (1351)
Lewis, F. H., (672)
Lewis, J. A., (417)
Lieberman, J. R., (937)
light
Botryotinia squamosa, sporulation affected by, 889
dwarf mistletoe on pine, 1271, **1272**
Helminthosporium maydis effect on races of, 676
Pythium aphanidermatum, oospore germination, 788
Septoria lycopersici on tomato affected by, 746
spectral reflectance & transmission in corn leaves affected by Helminthosporium maydis, 1210
Ligustrum japonicum, Cercospora leaf spot of, 806
Lim, S. M., 968
Lindberg, G. D., 772, (806)
Linderman, R. G., (647), 736, 772
Lindsey, D. L., (1238)
Lindsey, D. W., 805
Line, R. F., 772
Liquidambar styraciflua, Xiphinema chambersi of, pathogenicity to, 333, **335**
Littrell, R. H., (757), 772, 805
Liu, K. C., 496, 1303
Liu, L. J., 773
Liu, S. C. Y., (794), (1110)
Livingston, C., (762)
loblolly pine (see **pine, loblolly**)
Lock, W., (481)
Lockwood, J. L., (766), (1107)
Loebenstein, G., (1007), (1453), (1461)
Lolium perenne
blind seed disease of, fungicides for, 605
ergot of, ascocarp suppression by fungicides, 609
Long, D., 773
Longidorus elongatus, relation to club root of cabbage, 1104
Loonan, D. V., (570)
López, A., 773
López-Abella, D., (933)
Lopez P., O., (775)
Lorbeer, J. W., (494), (496), 773, (870), (889), (1263), (1266)
Louie, R., (748), 774
Lownsbery, B. F., 774
Lozano, J. C., 774
Luig, N. H., 1171
Luke, H. H., 414
Lukezic, F. L., (555), (1351)
Lumsden, R. D., 774
Lung, M. C. Y., (782), 805, 1473
Lycopersicon spp., bacterial canker of, factors affecting, 757
esculentum (see also **tomato**)
index plant for hydrogen chloride, 427
pimpinellifolium (see also **tomato**)
Fusarium wilt of, 743
Lyda, S. D., (807), (1410)

Macadamia integrifolia, Botrytis blight of, epidemiology, 316
MacBeath, J. H., 935
Mace, M. E., 651, 774, 796
MacHardy, W. E., (745), (1232), (1256)
MacKenzie, D. R., 775
MacNeill, B. H., 496
Macrophomina
phaseoli
on beans, 11
isolation from soil, 1098
use of selective medium, 1108
on soybean, variation among isolates of, 1108
phaseolina, on soybean, host-parasite relations, 743
Macrosiphum euphorbiae, vector for beet yellow stunt on sugar beet & lettuce, 161
Macrosteles fascifrons (see also **leafhopper**)
clover phyllody related to, 50
oat blue dwarf virus multiplication in, 745
Magyarosy, A., (762), 775
Mai, W. F., (172), (503)
Maiello, J. M., (68), 496
Maino, A. L., 775
maize (see **corn**)
maize dwarf mosaic virus
aerial detection of, 1070
chloroplast role in virus replication, 1108
concentration in corn hybrids, 640
on corn, host variation in, 774
dilution assays of, statistical analysis in, 366
on grasses, compared with sugarcane mosaic virus, 1466
infectivity affected by pesticides, 805
purification of
by centrifugation, 760
factors affecting, 812
RNA from, properties of, 253
on sorghum, relation to Helminthosporium maydis, 802
strain B, characterization of, 764
sugarcane mosaic virus mixed with, on sugarcane, 760, 769
ultrastructure of corn & Johnson grass roots, 1109
Makarski, J. S., 497
Malaguti, G., 12, 775
mal secco disease (see **Deuterophoma tracheiphila**)
Malus sylvestris (see also **apple**)
Erwinia amylovora recovered from, 39, [*31*]
fire blight of, affected by pesticide oil, 355, **357**
manganese
cowpea chlorotic mottle virus affected by, in cowpea, 1206
effect on potato spindle tuber virus on tomato, 516, **518**
Manibhushanrao, K., 1005
Manihot
esculenta, bacteriosis in, resistance to, in Colombia, 774
utilissima, vascular streaking in, 11
Manilkara huberi, decay resistance of, in Brazil, 784
Manji, B. T., (579), 776, (781)
Manning, W. J., 497
manuscript preparation, 1
Manzer, F. E., (500), 776
maple, sugar- (see **Acer saccharum**)
Maramorosch, K., (111), (298), 497, (498), (670), (671), 776, (826), 1230
Marchetti, M. A., (671)
marigold (see **Tagetes erecta**)
Marks, C. F., 776
Martin B., C., 1164
Martin, F. G., (302)
Martin, M. W., (954)
Martin, N. E., 226
Martin, W. J., 776
Martinez-Lopez, G., 776
Martinson, C. A., (751), (1107)
Marx, D. H., (1197)
Mateljka, J. C., (793)
Mathenge, G. R., (166)
Mathur, S. B., (1102)
Matsui, C., (448), (615), (663), (810)
Matsumoto, T. T., 1104
Matuo, T., 731
Maxwell, D. P., (1439)
Maxwell, R. C., (758)
May, L. C., (898)
Mayhew, D. E., (987), 1108

McCain, A. H., 1098
McCarter, S. M., (373), 805, 940, 1223
McCoy, N. L., (807)
McCoy, R. E., 1188, 1195
McCrum, R. C., (500), (776), 777
McCutcheon, O. D., (715), (901)
McDaniel, G. L., (987)
McDaniel, R. G., (798)
McDonald, G. I., 777
McDonald, J. G., 387
McIntyre, G. A., (499)
McIntyre, J. L., 777
McKeen, W. E., 777
McLean, G. D., 777, 1108
McMillan, R. T., Jr., (11), 777
McWain, P., (761)
medicarpin, degraded by fungi on alfalfa, 499
Meignoz, R., (1477)
Meiners, J. P., (667)
Melampsora lini
on flax
resistance genes for, 800
RNA synthesis changes in interactions, 1106
Melching, J. B., (789)
Melching, J. S., 670
Melhuish, J. H., Jr., 777
Meloidogyne spp.
on pine, relation to ectomycorrhizae, 785
on watermelon, relation to Fusarium wilt, 791
graminis, sex determination of, 673
hapla
on alfalfa
electron microscopy of, 792
relation to Ditylenchus dipsaci, 1103
relation to club root of cabbage, 1104
on sugar beet, relation to Heterodera, histopathology, 1103
on vegetables, population density vs. crop loss, 981
incognita
on alfalfa, resistant clones in, 780
on cotton, after sod, 785
methyl bromide fumigation for, 191
population affected by fertilizer & crop sequence, 802
population changes of, factors affecting, 801
in soil, storage temp affecting recovery of, 819
on tomato
bacterial interaction with, 767
density vs. yield, 801
organic mulch effect, 767
javanica, on tobacco, resistance to, 672
Melouk, H. A., 576, 1104
Meneley, J. C., 778
Mentha piperita, Phoma strasseri on, pathogenicity to, 576
Merkle, O. G., (785)
Merkens, W. S. W., (754)
methyl 2-benzimidazolecarbamate (see **fungicides**, specific)
methyl bromide, fumigant for nematodes, 191
methylisothiocyanate (see **fungicides**, specific)
Metrosideros collins, decline of, in Hawaii, 770
Meyer, W. A., 1108, 1414
Meyers, J. A., 1148
Michael, A. H., 1052
Michell, R. E., 336
Mielinis, N. M., (750)
Milbrath, G. M., 739
mild alfalfa witches'-broom diseases, characterization of, 1011
Milholland, R. D., 137, 654
Millar, R. L., (499), (758)
Miller, C. R., 12
Miller, D. E., (306), (1101)
Miller, J. W., (499), (788)
Miller, L. I., 670, 778
Miller, P. M., 497
Miller, T. D., (771), 778, 1175
Miller, V. L., (761)
Millikan, D. F., 778, (787)
Minteer, R., (191)
Minton, E. B., 582
Mircetich, S. M., (529), 671, (750), 1294
Mirocha, C. J., 778, (937)
Mitchell, J. E., (149), (369)
Miyakawa, T., (663)
Mobley, R. D., 300
Mohan, S. K., 779
Moline, H. E., (987), 1109
Moller, W. J., 779
Monilinia fructicola
on peach
control by thiophanate-methyl, 781
survival in branches of, 1369, **1371**
spore germination inhibited by capsidiol & cepsenone, 1186
Monilochaetes infuscans, chemical control of, on sweet potato, 667
Monroe, R. L., (903)
Montaño, J., 779
Moody, A. R., 264, 1347
Moody, E. H., (774)
Moore, R. K., 498, (1470)
Morgan, P., 1104
Morin, C. W., (310)
Morris, T. J., 779, 1109
Morrison, L. S., 806
Morrison, R. H., (647)
Morus alba, Fusarium solani pisi on, Hypomyces stage of, 731, **733**
Moseman, J. G., (1219)
Moser, P. E., 564
Motta, J., (797)
Mount, M. S., (498)
Mueller, W. C., 779
Mukunya, D. M., (799)
Mulanax, M. W., 1105
Mumford, D. L., 1217
Munnecke, D. E., (191), (567), (781)
Murakishi, H. H., (1107), (1110)
Musa sp. (see **banana**)
Muse, B. D., 779
Muse, R. R., (779), 780
mushroom pathogens, on Agaricus bisporus, thermal sensitivity of, 1470
Mussell, H. W., 498, 780
Mwaura, L. K., (166)
mycoplasma (see also **aster yellows**)
bodies of, with elm phloem necrosis, 140, **141**, **142**
on citrus leaves, compared with tristeza, 663
citrus stubborn association, 729, **730**, 1102
citrus stubborn disease relation to, growth factors, 758
enigma of, in plants & insects, 1230
peach X-disease associated, morphology of, 935, **936**
in periwinkle, ultrastructure affected by temp, 1453, **1454**, **1455**
in Scoparia dulcis, 670
Western X-disease, temp effect in vector, 452
witches'-broom of sweet potato, 903, **907**
mycorrhiza
Endogone vs. Phytophthora, on soybean, 896
fatty acids & sterols from, 777
fungus nematode relationship, on shortleaf pine, 801

vesicular-arbuscular-, in grape, 172, **174**
Mycosphaerella
citri sp. nov., cause of citrus greasy spot, 260
ligulicola
on chrysanthemum, factors affecting disease, 1195
reproduction in, factors affecting, 1188
mycostasis (see **fungistasis**)
mycotoxin (see **phytoalexin** and **toxin**)
Myers, R., (823)
Myzus persicae
acquisition factor, for transmission of cauliflower mosaic virus, 782
TMV & brome mosaic virus in, 429, **431**, **432**
vector for
beet yellow stunt, on sugar beet & lettuce, 161
pea enation mosaic virus, protein changes, 1018
sweet potato russet crack virus, 750

Nagle, M. E., (520)
Nash, G., (209)
Nasonovia lactucae, vector for beet yellow stunt on sugar beet & lettuce, 161
nectarine (see also **Prunus spp.**)
changes in storage, 790
postharvest decay of, control for, 129
Nectria galligena
on apple, Difolatan & copper sulfate for, 755
associated with aspen canker, 213, **214**
Neergaard, P., (1102)
Nelson, L. A., (801)
Nelson, M. R., (739)
Nelson, P. E., (493), (700), (782), (1052), (1318), (1337)
Nelson, R. R., 498, (748)
nematicide(s), K & Na azides, properties of, 786
nematodes (see also under genera of)
mycorrhizal relationship, in pine, 801
relation to Fusarium blight of bluegrass, 1311
Neocosmospora vasinfecta, on soybean, internal stem browning of, 612
new diseases, species, and varieties
common bean mosaic virus, new strain, 667
Cylindrocladium clavatum, on pine, Araucaria, & Eucalyptus, in Brazil, 898, **899**, *[32]*
Kaskaskia gleditsiae gen. et sp. nov., on Gleditsia, 926, **927–929**
lima bean virus, 803
Mycosphaerella citri, on citrus, 260, **261**
Pyricularia sp., on rye, ryegrass, & wheat, 806
sunflower yellows, caused by Phialophora sp., 1088, **1089**, **1091**
Niblett, C. L., 1109
Nicholson, J. F., (296), 1183, 1261
Nicholson, R. L., 780, 1242
Nicotiana tabacum (see **tobacco**)
Nielsen, L. W., (804)
Nienhaus, F., 313
Nigh, E. L., Jr., 780
Niles, R. M., 498
Northern corn leaf blight, epidemiology of, 11
Novacky, A., (779), 780
Nusbaum, C. J., (1227)
Nyland, G., (935)
Nyvall, R. F., 1419

oak (see **Quercus spp.**)
oat blue dwarf virus
characterization of, 783
physical properties of, 773
propagation of, in vector, 745
oats
crown rust tolerance of, in wild Avena sterilis, 1444
Poa semilatent virus on, 508, **510**
resistance (horizontal) to crown rust, 414
obituaries
Mathilde Bensaude, 1229
John Shaw Boyce, 681
William Earl Cooper, 1227
Byron R. Houston, 303
Randall Rich Kincaid, 682
Kermit William Kreitlow, 943
Edmund Brian Lambert, 304
John R. Large, 305
Irving E. Melhus, 391
George John Stessel, 1228
Obrero, F. P., (793)
Oda, M. K., (385)
Odle, W. C., (793)
Odvody, G. N., 1110
Ogawa, J. M., 579, 781, (784)
Ohr, H. D., 781
Oidium sp., on Eucalyptus, spore release in, 1099
Oldham, N. D., (384)
Olivas, E., (779)
Olthof, T. H. A., 981
onion
Aspergillus niger on, nuclear effect, 770
Botrytis leaf blight of, fungicides for, 773
Fusarium oxysporum cepae on, ecology & pathology of, 870, **874**
Pseudomonas cepacia on
factors affecting, 496
histology in leaf infection, 1266, **1268**, **1269**
relation to irrigation water, 1103
Pyrenochaeta terrestris on, host inhibitor effects, 1105
Urocystis colchici infection of, factors affecting, 282
Ooka, J. J., 781
Ophiobolus graminis, on wheat, N effects for, 434
Opuntia spp.
viruses of, on wild plants, 97
witches'-broom of, etiology, 497
orange (see also **citrus**)
benomyl for, application & persistence in, 1434
Orlob, G. B., (429)
Oryza sativa (see **rice**)
Osman, F. M., 781, 1105
Ostazeski, S. A., 943
Otta, J. D., 1110
Oyekan, P. O., 368
ozone (see **pollution**, air-)

Pack, M. R., (1247)
Pady, S. M., 1099
Palomar, M. K., 1110
Palyusik, M., (778)
Panax Ginseng, Fusarium solani pisi on, Hypomyces stage for, 731, **733**
Panicum miliaceum, St. Augustine decline of, 772
Panopoulos, N. J., 43, (524), 781
Papavizas, G. C., 304, 417, 545, 688
Papendick, R. I., (86)
Papia, P. M., (497)
Pappelis, A. J., (770)
Parashar, R. D., 1075
parinol (see **fungicides**, specific)
Parker, A. K., 1160
Partridge, J. E., (768), 781
Passiflora edulis, Alternaria tenuis on, toxin from, 744

Patel, B. N., (801)
Pathre, S., (778)
Patil, S. S., (744), 782
Paxton, J. D., (1457)
PCNB (see **fungicides**, specific)
pea
Aspergillus ruber
on stored seed of, 206
toxin involvement, 209, **211**
benomyl uptake in, metabolic fate of, 630
exudates of, effect on chlamydospore germination of Fusarium, 1111
Fusarium oxysporum pisi race 5 on, infection sites, 1419
Fusarium root rot of, soil chemicals for, 86
Fusarium solani pisi on, Hypomyces stage of, 731, **733**
nematodes on, relation to peroxidase & phenol content, 779
proteins of, affected by pea enation mosaic virus, 1018
root pathogens of, relation to cropping practice, 1101
root rot complex of, role of nematodes, 369
seed deterioration from aging and Aspergillus, 495
pea enation mosaic virus, protein patterns of plant & aphid affected by, 1018
pea fizzletop virus, symptoms of, 268, **270**
pea seed-borne mosaic virus
host-virus relationships, 1101
purification of, 1104
peach (see also **Prunus** persica)
apple mildew on, 776
Armillaria mellea on, rhizomorphs vs. root lipid, 1347
changes in storage, 790
fruit of, fungicide penetration, 784
Monilinia fructicola on, survival in branches of, 1369, **1371**
postharvest decay of, control for, 129, 672
root lesion nematode on, soil management for, 776
roots of, effect of soil fumigation on, 745
stem canker of, nematodes, fungi, & bacteria relations to, 774
peanut
Aspergillus spp. on, aflatoxin strains of, 771
Aspergillus flavus in
flowers of, 797
geocarposphere of, conidial germination & population, 1387
relation to other fungi, colonization in gnotobiotically grown plants, 1238
Cercospora leaf spot of
control, 12
epidemiology affected by benomyl, 1029
fungicides for, 803
Endogone spp. on roots of, 783
pod breakdown, factors affecting, 759
pod rot of, Pythium & Fusarium as cofactors, 1331
rust of,
epidemic origin in Texas, 794
fungicides for, 803
resistance to, 748
peanut mottle virus, purification & properties of, 832, **834**, **837**
peanut stunt virus, cucumber mosaic virus relationship to, 793
pear (see also **Pyrus communis**)
fire blight of
medium for monitoring bacterial populations, 1175
streptomycin resistant strains, 779
Pearson, P. W., (785)
pecan, leaf scorch of, mycoflora associated, 805
pecan shuck disease, etiology of, 762
Pecknold, P. C., 782
pectic enzyme (see **enzymes**, specific)
Peet, C. E., 671
Pelargonium spp., Xanthomonas pelargonii on, histopathology of, 1337, **1339**, **1341–1343**, **1345**
Pelcher, L. E., 1110
Pell, E. J., 498
Pellissier, M., 580
Peltogyne maranhensis, decay resistance of, in Brazil, 784
Penicillium
brevi-compactum, viruslike particles in hyphae & spores of, 823
digitatum
2-aminobutane, mechanism of action to, 239
on orange, benomyl for, 1434
o-phenylphenol toxic to, 756
spore germination of, affected by citrus compounds, 488
simplicissimum, effect on axenically grown marigolds, 669
stoloniferum
viruslike particles in
electron microscopy, 668
hyphae & spores from, 823, **824**
Pennisetum typhoides, St. Augustine decline of, 772
Pennypacker, B. W., 782, 1318
Pentstemon, powdery mildew of, spore release in, 1099
pepper (see also **Capsicum** and **Piper nigrum**)
virus identifications of, in Florida, 800
perchlorate toxicity, to soybean, in Chile, leaf rugosity caused by, 1164, **1165**
Percich, J. A., 1110
peroxidase (see **enzymes**, specific)
peroxyacetyl nitrate, effect on chrysanthemum cultivars, 494
Perry, C. E., (1137)
Persea americana
Colletotrichum gloeosporioides on fruit of, 592, **593**
decay & chilling injury in, environmental control of, 784
Phytophthora citricola on, new pathogen on, 799
Peru tomato virus
characteristics of, 784
source & inheritance to, 764
Peterson, E. A., (50), (377)
Pfleger, F. L., 1105
Phakospora gossypii, on cotton, in Venezuela, 775
Phaseolus spp., cultivars of, resistant to Pythium aphanidermatum, 769
lunatus, new virus of, isolation, 803
vulgaris
bean common mosaic virus of, local lesion host for, 489
bean yellow stipple virus on, transmission & properties of, 759
Colletotrichum lindemuthianum on, varietal resistance to, 756
cowpea rust of, 27, [*31*]
effects of ozone on adenine nucleotides, 498
Entyloma smut on, distribution in Central America, 794
Fusarium infection vs. soil factors, 1101
halo blight of, by Achromobacter, 775
interaction of 4 bacterial spp. in leaves of, 1120, **1124**
internal stem browning of, by Neocosmospora vasinfecta, 612
ozone effect on
respiration, 499
surface mycoflora of, 497
ozone injury to, systemic fungicides for, 580
phytoalexin response in, relation to anthracnose, 783
potato virus M, electron microscopy of, 77, **79**, **82**, **84**
Pseudomonas on, growth related to S, 300

Pseudomonas syringae on, factors affecting, 678
root pathogens of, relation to cropping practice, 1101
root rot of
reduced by subsoiling, 306, **308**
soil factors affecting, 550
rust of, dark therapy for, 1139, **1140**
southern bean mosaic virus of, distribution in seed, 387
virus transmission in, heat predisposition to, 755
Xanthomonas spp. on, pathogenic vs. nonpathogenic spp. of, 329
Xanthomonas phaseoli on, nonsystemic nature of, 761
yellows type diseases of, resistance to, 1101
phenolase (see **enzymes**, specific)
phenols
in banana & tomato cells, ultrastructure of, 779
relation to peroxidase & nematodes on peas, 779
phenylmercuric acetate (see **fungicides**, specific)
Phialophora sp., on sunflower, new systemic disease of, 1088, **1089**, **1091**
Philip, A., 1110
Phillips, D. V., 612, 782, 1334
Phoma strasseri
glucosidase from, 1104
on peppermint, pathogenicity to, 576
Phomopsis sp. (see **Diaporthe phaseolorum sojae**)
viticola, pycnidium maturity vs. grapevine growth, 748
phosphatidase (see **enzymes**, specific)
phosphorus, effect on curly top of tomato, 524
Phyllosticta maydis
host-specific toxin from, 799
characteristics of, 1107
phylloxera, relation to grape replant situation, 503
Phymatotrichum omnivorum, effect of soil temp & moisture on, 828, **830**
Physalis angulata, virus from, related to Belladonna mottle virus, 1109
Physalospora obtusa
on apple, control by triarimol, 669
sugar hydrolysis by, factors affecting, 667
physiology of disease
antigens common to cotton varieties & wilt fungi, 230
apple leaves, virus-infected, phenolase & oxidase in, 778
Armillaria mellea
rhizomorph stimulation by root lipid, 1347
on sugar maple, defoliation-induced chemical changes, 1278
bacteria on bean, S diffusion, 300
black rot of cabbage, 722
blister rust of pine, 226
cell wall & plasma membrane alterations in diseased plants, 798
Cercospora nicotianae on tobacco leaves, chemical changes in, 1392
Dutch elm disease, host physiology effects, 457
elm to Ceratocystis ulmi, 909
Erwinia amylovora on tobacco leaves, protein changes, 1428
Fusarium wilt of tomato, 651, **652**
halo blight of bean, cell wall degradation, 775
Hypoxylon canker on Populus, 787
Pseudomonas on tobacco, 536
Pseudomonas pisi on tobacco leaves, electrolyte leakage & membrane damage, 1327, **1328–1330**
Rhizoctonia solani, exogenous nutrition influence, 278
steroid glycoalkaloid vs. rishitin, in potato tubers, 789
wheat to barley yellow dwarf virus, 290, 580
physiology of microorganisms
Armillaria mellea, role of fatty acids & lipids, 264
Botryotinia squamosa, sporulation factors, 889
Colletotrichum lindemuthianum, endopolygalacturonase effects, 757
Erwinia spp., ribosomal properties of, gel electrophoresis in, 1077
Erysiphe graminis, relation to genetics, symposium, 401
Fusarium oxysporum vasinfectum, enzyme production by, C & N sources, 501
Mycosphaerella ligulicola, environmental factors affecting reproduction, 1188
Penicillium digitatum, mechanism of action of 2-aminobutane to, 239
Phoma strasseri, glucosidase from, 1104
Pseudomonas phaseolicola, chemotaxis to carbohydrates & organic acids, 781
Pseudomonas savastanoi, metabolic behavior of isolates compared, 349
Sclerotium rolfsii, bean cell wall enzymes, 495
phytoalexin (see also **toxin**)
antifungal & hemolytic activities of, 795
in bean, protection to anthracnose, 783
in clover leaves, Helminthosporium turcicum infection, 235
in ginkgo, fungus induced, 493
heavy metals inducing, mode of action, 761
hydroxyphaseollin in soybean, 439
after virus infection, 719
induced by fungicides, 1113
phaseollin, altered by Fusarium solani phaseoli, 794
phaseollin & pisatin, degraded by Stemphylium, 763
pisatin, on pea induced by Fusarium solani, 1101
in soybean, production vs. cross-protection, 1457
use in cross-protection, in soybean, 645
vergosin & hemigossypol
in cotton, role in wilt resistance, 1402
from wilted cotton plants, 1398
Phytophthora spp.
fungicides for, at various soil depths, 793
RNA in cells of, electrophoresis determination of, 785
in safflower, resistance to, nature of, 667
cactorum, in apple seedlings, resistance to, 743
capsici, strains of, inheritance to, 20, **24**
cinnamomi
on Eucalyptus, in Australia, 972, **973**
nematode relation in pine mycorrhizae, 801
on Pinus clausa, relation to mycorrhizae, 1197
citricola, on Persea americana, new host for, 799
citrophthora
on lemon
postinfection changes, 1361
respiration patterns, 932
drechsleri, on safflower, resistance to, 471
infestans, tuber yield effect of, 92
lateralis, chlamydospore formation in, factors affecting, 1102
megasperma, on alfalfa, synergism with mosaic virus, 760
megasperma sojae
phytoalexin from, on Canavalia ensiformis & Vicia faba, 1365
phytoalexin induced by, in soybean, 439
on safflower, resistance to, 471
on soybean
chemical defense mechanism to, 768
cross-protection against, 645
electron microscopy of, 670
phytoalexins produced in, by cross-protection, 1457
relation to Endogone, 896
root & stem symptoms, 1414
on soybean hypocotyls, enzymatic response to, 781

palmivora
black pepper foot rot, in Brazil & Puerto Rico, 144, **146, 147**
sporulation in, 993
zoospore adhesion to surfaces, 790
parasitica
oospore formation in, 765
zoospore survival & germination, 792
parasitica nicotianae
sporulation of, 993
on tobacco
pathogenesis vs. propagule density, 474
relation to soil Ca, 302
tissue culture for study, 1439
Pierce, W. H., (499)
Pinckard, J. A., (460), (796)
pine (see also **Pinus spp.**)
loblolly
beetle & Fomes association, 670
Fomes annosus on, soil factors affecting, 743
fusiform rust of, factors affecting, 747
tissue culture of, 743
ponderosa
Armillaria mellea on, rhizomorphs vs. root lipid, 1347
dwarf mistletoe of, growth, 769
ectomycorrhizae vs. Meloidogyne sp., histopathology, 785
tipburn of, related to salinity, 705
sapwood changes, water effects on, 753
pineapple, Thielaviopsis paradoxa on, in Puerto Rico, 773
Pinus spp. (see also **pine**)
Cronartium spp. on, comparison of, 767
new root disease of, in Brazil, 898, [*32*]
clausa, Phytophthora cinnamomi on, role of mycorrhizae in control, 1197
elliottii
Cronartium fusiforme on, axenic culture of, 1417, **1418**
Fomes annosus on, factors affecting, 422
fusiform rust of, fertilizer effects, 788
monticola
blister rust of, effect on host physiology, 226
Cronartium ribicola on, racial variation in, 777
palustris, brown spot needle blight of, resistance to, 325, **327**
ponderosa (see **pine**, ponderosa)
radiata
ethylene produced in, from Sirex-Amylostereum infection, 1407
Scirrhia pini on, factors affecting incubation & inoculation, 1160
sabiniana, dwarf mistletoe of, effect of light on, 1271, **1272**
sylvestris, Dothiostroma pini on, 671
taeda (see **pine**, loblolly)
Pinkas, J., (1007)
Piper nigrum (see also **pepper**)
Phytophthora foot rot of, in Brazil & Puerto Rico, 144, **146, 147**
Pirone, T. P., 782, (1283), (1473)
Pisolithus tinctorius, fatty acids & sterols from, 777
Pisum sativum (see **pea**)
Pitblado, R. E., 513
Pittarelli, G. W., (672)
Pitts, G., (764)
Plantago, isometric virus from, unidentified, 761
Plasmodiophora brassicae, on cabbage, interaction with nematodes, 1104
Plasmopara halstedii
on sunflower, IAA activity in, 751
zoosporangia of, role in disease, 751
Platanus acerifolia, zonate leaf spot on, 758
Plavšić-Banjac, B., 298, 498, 671, (776)
Poa pratensis
Helminthosporium sativum on, effect of drought, 751
Helminthosporium sorokinianum of, factors affecting spore germination & pathogenicity, 1133, [*32*]
Poa semilatent virus, from native grasses, 508
Podger, F. D., 972
Podosphaera sp., on peach, from apple, 776
leucotricha
on apple
heterothallism in, 1102
spore release in, 1099
Polach, F. J., 20, 782
Polanco, C. D., 783
Politis, D. J., (808)
pollution
air-
chloride analysis of vegetation, 427
fluoride, effect on pollen & fruit of cucumber & tomato, 1247
indicator plant for, in Mexico, 753
indicator plant network, in Georgia, 795
ozone
alfalfa injured by, 759
conifers susceptible to, 14, **17**
effect on
barley mildew, 1144
bean adenine nucleotides, 498
bean leaf surface mycoflora, growth & nodulation, 597
bean leaves, isozyme changes in, 752
bean, reduced by fungicides, 580
bean, respiration affected by, 499
poplar, 11 clones, 501
soybeans, SO_2 comparison, 763
sweet corn yield, 683
tobacco, 63, 659
pollen, ultrastructure of, 495
synergism with
peroxyacetyl nitrate, 496
SO_2, on pine, 493
peroxyacetyl nitrate on chrysanthemum, 494
pine needles, histology in, 496
SO_2
-ozone synergism, in white pine, 493
on soybeans, ozone comparison, 763
Populus spp.
ozone effect on 11 clones of, 501
ozone & peroxyacetyl nitrate effects on, 496
tremuloides (see also **aspen**)
Hypoxylon canker of, host physiology changed by, 787
Porter, D. M., (759), 783
postharvest decay, on orange, benomyl for, 1434
potassium & sodium azides, nematicidal properties of, 786
potato
bacterial wilt of, field resistance to, 760
late blight vs. tuber yield, 92
Pseudomonas solanacearum on, clones resistant to, 757
soft rot of, role of soil moisture, 747
TMV on, virus morphology & host cytological response to, 1303, **1305–1310**
Verticillium wilt of, soil fumigation for, 520, [*31*]
virus infection vs. lectins and hemolysins, 496
potato cork virus, indicators for, 12
potato spindle tuber
citrus exocortis compared to, 790
symptoms of, enhanced by Mn, 516, **518**

potato virus M, electron microscopy of, on red kidney bean, 77, **79**, **82**, **84**
potato virus X
protein of, enzymatic digestion effects on, 1154
serology & properties of, 500
in tobacco, leaf inclusions in, 788
potato virus Y
on pepper, in Florida, 800
in tobacco, effect of virus X on, 760
potato yellow dwarf virus, assay of, 765
Potter, J. W., (981)
Pounds, E. K., (683)
Powell, C. A., 1111
Powell, W. M., (336), (819)
Powelson, R. L., (1105)
Pratt, A. L., 499, (750)
Pratylenchus
brachyurus, Fusarium wilt of cotton related to, 336
penetrans
on peach roots, soil management for, 776
relation to club root of cabbage, 1104
role in pea root rot complex, 369, **371**
Verticillium interaction with, in tomato roots, 362
Pring, D. R., 253, 783
Pritchard, D. W., (786)
Probasco, E. G., 1105
protease (see **enzymes**, specific)
Prunus spp. (see also **cherry**, **nectarine**, and **peach**)
stem pitting of, 671
relationships, 1294, **1295**, **1296**, **1298**, **1299**, **1301**
persica
Armillaria root rot of, seasonal development in, 567
peach X-disease, mycoplasmalike bodies in, 935
Prunus necrotic ringspot virus of, 529
Prunus necrotic ringspot virus, on peach, 529
Prunus stem pitting virus
nematode vector for, 667
properties of, compared with tomato ringspot virus, 750
root chip inoculation method, 672
soil transmission of, 672
Pseudomonas spp.
on cabbage, freezing injury effect on, 322
cotton fibers discolored by, 940
DNA homologies among, 782
on Helianthus annuus, insect vector for, 758
on peach, characterization of, 754
pectolytic fluorescent-, selective medium for, 998
cepacia
on onion
disease vs. irrigation water, 1103
factors affecting, 496
on onion leaves, multiplication of, 1263, **1266**, **1268**, **1269**
eriobotryae, strains of, from loquat cankers, 310
fluorescens
pectic lyases produced by, activity of, 499
relation to 3 Xanthomonas spp., in bean & tomato leaves, 1120, **1124**
glycinea
selective medium for, 674, [*31*]
on soybean
disease development, 1167, **1169**
epidemiology of, 57
seed detection of, 1075
soil temp effects, 296
systemic toxemia from, 964, **966**
yellow bacteria interaction, 787
lachrymans, on watermelon, leaf spot caused by, 542
phaseolicola
Achromobacter sp., relationship, cell degradation, 775
on bean, infection dynamics, 756
on bean leaves, S diffusion from, 300
chemotaxis to carbohydrates & organic acids, 781
phytotoxin from, purification of, 782
pisi
in tobacco
factors affecting electrolyte leakage & membranes, 1327, **1328**–**1330**
hypersensitive reaction to, 780
savastanoi, olive & oleander isolates compared, metabolic behavior, 349
solanacearum
biochemical mutants of, virulence, 1107
nematode interaction with, in tomato, 767
on potato, clones resistant to, 757
selective medium for, 1373
on Solanum phureja, resistant genes in, 1093
strains of, catalase activity in, 294
on tobacco, hypersensitivity prevented, 536
syringae
on bean
host nutrition effect, 786
isolate vs. virulence, 678, **679**
intraspecific transformation of, 794
peach stem canker relationship, 774
on Vicia villosa, survival of, 762
on wheat, leaf necrosis from, 1110
tabaci, avirulent-, pear fire blight protected by, 777
Pseudotsuga menziesii
Armillaria mellea on, rhizomorphs vs. root lipid, 1347
ectomycorrhizae in, cropping history & fumigation for, 500
Fusarium oxysporum on seedlings of, strains, 481
Rhizina undulata root rot on, 1104
Puccinia
arachidis
on peanut
fungicides for, 803
resistance to, 748
carthami, spore germination in, factors affecting, 436
coronata avenae
on Avena sterilis, tolerance of wild types, 1444
races of, half-life in, 749
resistance to, in oats, 414
graminis, on triticale, 773
graminis tritici
epidemiological models for, slow rust in, 775
genetics vs. biochemistry in resistance, symposium, 392
growth on defined medium, 802, 1032, **1034**, **1035**
host gene expression & interaction to, factors affecting, 1171
races of, epidemiology, in Africa, 166
resistance to, 785
ribosomes of, 502
spore dispersal in, 70
spore germination
affected by tobacco smoke, 670
factors, 116
purpurea, on sorghum, stable in North America, 757
recondita
Darluca filum mycoparasite on, 931
genetic analysis of resistance to, 866
spore dispersal in, 70
recondita tritici
crop loss estimates by, 944
disease prediction, equations for, 947
wheat resistant to, genetic analysis, 1112
sorghi, on corn, resistance to, 769

striiformis
spore germination affected by tobacco smoke, 670
on wheat
epidemiology, in Oregon, 668
temp effect on infection, 772
Putz, C., 1477
Pyracantha coccinea, scab of, cross inoculations, 914
Pyrenochaeta terrestris
on onion, host inhibitor to, temp effect, 1105
toxic factor from, in onions, 763
Pyrenophora trichostoma
Leptosphaeria avenaria relation, on wheat, 765
propagules of, on wheat, 627, **628**
Pyricularia sp., on forage grasses in Louisiana, 806
oryzae
detection on rice seed, by ultraviolet light, 1102
epidemics on rice, prediction of, 1126
pathogenic stability in, 771
on rice
low night temp effect, 1005, **1006**
soil fungicides for, 758
spore germination affected by tobacco smoke, 670
Pyrus communis (see also **pear**)
Erwinia amylovora recovered from, 39, [*31*]
fire blight of, affected by pesticide oil, 355, **357**
Pythium spp.
on cotton, soil factors & fungicides affecting, 373
extracts from, effect on rhizosphere & soil fungi, 808
peach stem canker relationship, 774
in soil, storage temp affecting recovery of, 819
aphanidermatum
on lettuce roots, fungus ultrastructure, 751
oospore germination
exogenous nutrients for, 791
light & Ca effects on, 788
nutrients & pH effects, 757
Phaseolus spp., in cultivars resistant to, 769
myriotylum, on peanut, role with Fusarium solani in pod rot, 1331
periplocum and prolatum, oospore formation in, steroid structure relation, 763
ultimum, on cucumber, fungicides for, 287

Quade, M., (793)
Quercus spp.
bacteria associated with honeycomb & ring failure, 796
oak wilt of, benomyl for, 761
TMV-like infection from leaves of, 313
alba
microorganism succession on, decay from, 256, **257**
wood-rotting fungi of, inhibition by ellagitannins, 620
rubra, microorganism succession of, decay from, 256, **257**

Raabe, R. D., 783, 914
radiation, gamma-, wood defects detected by, 756
radish mosaic virus, electron microscopy of, 448, **449–451**
Ragsdale, N. N., 671
Rahe, J. E., 783
Rajaram, S., (773), (1171)
Rambo, G. W., (668), (749)
Ramftl, A., (780)
Ramulispora sorghi, on sorghum, in Nebraska, 1110
Rand, R. E., (762)
raspberry bushy dwarf virus, occurrence on Rubus, 752
raspberry mosaic virus, on raspberry, bacilliform viruslike particles in, 1477
Ravenscroft, A. V., 783
Ravetto, D. J., 784
Raychaudhuri, S. P., (776)
Raymer, W. B., (764), 784
Reddy, A. P. K., (11)
Reddy, D. V. R., 784
Reeder, W. F., 784
Reeves, F. B., (762)
Reil, W. O., (779)
Reilly, J. J., 1113
Reis, M. S., 784
Renk, J. J., (796)
resistance (see also **genetics**)
alfalfa, to bacterial wilt, 555
apple, to Phytophthora cactorum, 743
barley, to powdery mildew, segregation of M1 genes, 1219
bean
to anthracnose, 756
to yellows type diseases, 1101
blueberry, to stem blight, 654
cabbage, to black rot, 247
corn, to Helminthosporium maydis race T, 747
cotton, to Diplodia gossypina, 460
cotton boll, to Fusarium spp., 1381
elm, to Ceratocystis ulmi, 789, 845
oats, to crown rust, 414
peanut
to Aspergillus strains, aflatoxin producers, 771
to rust, 748
Phaseolus spp., to Pythium aphanidermatum, 769
pine
to brown spot needle blight, 325
to Sirex-Amylostereum attack, ethylene relation, 1407
potato, to Pseudomonas solanacearum, 760, 1093
safflower, to Phytophthora, 471
soybean, to brown stem rot, correlation coefficients of, criteria, 1112
sugar beet, to Cercospora beticola, morphological factors, 1095
sugarcane, to helminthosporoside, 466
tobacco
to black shank disease, tissue culture, 1439
to nematodes & fungi, 672
to 4 viruses, 668
tomato
to bacterial canker, 756
to curly top virus
breeding methods for, 564
factor of, 954
to Fusarium infections, mechanisms, 1256, **1258**
wheat
to leaf rust, 866, 1112
to Puccinia graminis tritici, culture 111-SS2, 785
wheat stem rust, host gene expression & interaction, factors affecting, 1171
Rettig, N., (1018)
Reyes, A. A., 1424
Reyes, L., 785
Reynolds, P. E., 499
Rhizina undulata, root rot of Douglas fir caused by, 1104
Rhizobium japonicum, on soybean, interaction with Heterodera glycines, 1201, **1204**
Rhizoctonia
fragariae, on strawberry, root rot of, pathology, 700, **701, 703**
solani (see also **Thanatephorus cucumeris**)
antifungal substance against, in soil, 595
on azalea, fertilizer effect on, 808
on Carissa grandiflora, blight of, 801

control by PCNB, nature of, 385
on cotton, infection response, 797
on Gynura & Hoya, fungicides for, 769
heterocaryons of, in field isolates, 748
histology of infected beet roots, 786
on legumes, group subspecies, 783
nutrition of, influence on virulence, 278
on snapbean, herbicide predisposition to, 785
in soil, colonization on stems & chitin, 852
sugar beet isolates, pathogenicity of, 202
on sugar beet, relation to herbicides, 743
Rhizopus
arrhizus
sporulation of, tryptophan & dimethyl sulfoxide effects on, 797
sterol metabolism of, 797
stolonifer
cold tolerant strain of, 1104
DNA polymerase from, 760
rhizosphere, fatty acids in, effect on fungistasis, 688
Rhoads, F. M., (302)
Rhododendron obtusum (see azalea)
Rhopalosiphum padi, TMV & brome mosaic virus in, 429, **431**, **432**
rice
bacterial blight of, in Asia, 11
blast of, temp effect, 1005, **1006**
nematode-weed interaction, 764
oxidases in, inhibition by sulfide, 634
panicle blast, predicting outbreaks of, 1126
Pyricularia oryzae on, soil fungicides for, 758
sulfide diseases of, 764
Xanthomonas oryzae on, yield reduced by, 670
rice tungro virus, strains of, varietal resistance to, 1116, **1117**
rice yellow dwarf, etiology of, in India, 776
Rich, S., (63)
Richardson, J., 491
Ridings, W. H., 806
Riedel, R. M., (1108)
Ries, S., 785
Riesselman, J. H., 1111
Riffle, J. W., 785
Riggs, R. D., (762)
Rintz, R. E., 806
Ripaldi, C. P., 499
Roberts, B. R., 457
Roberts, D. A., 499, (788)
Robinson, P. W., 533
Rochow, W. F., (921)
Rodriguez, A., (773)
Rodriguez, R. A., (790)
Rodriguez de Lecea, J., (33)
Rodriguez-Kabana, R., (744), 785, (802)
Roelfs, A. P., 70, (944), (947)
Roheim, J. R., 785
Rohrbach, K. G., (316)
Roker, H. R., (795)
Rolston, L. H., (747)
Romig, W. R., 785
Romine, M., 602
Roncadori, R. W., 373, 1137, (1381)
Rosa spp., powdery mildew of, spore release in, 1099
rose, black spot of, fungicides for, 803
Rosenkranz, E., 786
Rosenow, D. T., (757)
Ross, A. F., (760), 786
Ross, E. W., 1197
Ross, J. P., (839), (887), 896
Rotylenchulus reniformis, host-cell responses to, 747
Roth, L. F., (1102)
Rowe, P. R., (760), 1093
Rowe, R. C., 1105
Rubio-Huertos, M., (810)
Rubus spp., raspberry bushy dwarf virus in, 752
idaeus, viruslike particles in mosaic symptoms, in France, 1477
occidentalis, tobacco streak virus of, 1001, **1002**
Ruehle, J. L., 333
Ruppel, E. G., 134, 202, 786, 1095
Rush, M. C., 786, 806
Russell, G. E., (1274)
Russell, K. W., 1105
Russell, T. E., 786
russet ring virus, on apple, purification & properties of, 494
rust (see under genera of)

Saad, S. M., 678, 786, 1111
Saccharomyces pastorianus, effect of benomyl & its hydrolysis product on, 669
Saccharum (see **sugarcane**)
Sackston, W. E., (751)
Saettler, A. W., 489
safflower (see **Carthamus tinctorius**)
Safford, J., (759)
Safir, G. R., 1210
Saidak, W. J., (776)
St. Augustine decline disease
on millets, 772
spectral reflectance measurements of, 793
Saits, G. H., (1210)
Sakuma, T., 499
Salas, J. A., (12)
Salix rigida, witches'-broom of, mycoplasmalike bodies in, 826, **827**
Sands, D. C., (747), 998
Saniewski, M., (778), 787
Santiago, A. G., (144), (667), (993)
Sasaki, T., 1126
Sasser, J. N., (786)
Sasser, M., (785)
Sauer, D. B., 787
Schaad, N. W., 787, (1077)
Schafer, J. F., (1109)
Scharpf, R. F., 1271
Schauerhamer, B., (778)
Scheffer, R. P., (752)
Schenck, N. C., (542)
Scherff, F. H., 787
Schick, F. J., (774)
Schiffmann-Nadel, M., (592), (932), (1361)
Schillinger, J. A., (745)
Schipper, A. L., Jr., 787
Schizaphis graminum, vector for barley yellow dwarf virus, 921
Schlegel, D. E., (753), (770)
Schmidt, R. A., 319, 788, (1417)
Schmitthenner, A. F., 788
Schneider, I. R., 788
Schneider, R. W., 345
Schooley, J., (496)
Schoulties, C. L., 788
Schreader, W. R., (579)
Schreiber, L. R., 499
Schroeder, H. F., (770)
Schroth, M. N., (300), (775), (781), (1175)
Schultz, O. E., 500
Scirrhia
acicola
isolated variation in, 768

on longleaf pine, resistance to, 325
pini, on Pinus radiata, factors affecting incubation, 1160
Sclerospora
philippinensis, chloroneb for control of, 500
sorghi, in corn, flowers & seeds, 817, **818**
Sclerotinia sclerotiorum
on bean hypocotyls, pH effect, 774
in cabbage, benomyl & cyanamide for, 1102
on field beans, epidemiology, in Nebraska, 1107
on soybean, relation to Phomopsis sp., in seed, 1261
Sclerotium
cepivorum, propagules in soil, enumeration of, 545
rolfsii
bean cell walls degraded by, 495
biocontrol using Trichoderma harzianum, 442, 808
galactosidase production by, 767
selective medium for, 744
on soybean, proteins from, 668
Scoparia dulcis, mycoplasmalike bodies in, 670
Scott, H. A., (125)
Secor, G. A., (1154)
Seliskar, C. E., (140)
Semancik, J. S., (777), (779), (1108), (1109)
Septoria lycopersici, resistance vs. light & peroxidase activity, 746
Sequeira, L., 536, (760), (774), (1093), (1107)
serology
antigens common to cotton & wilt fungi, 230
beet western yellows & turnip yellows viruses, relation, 1274
beet yellow stunt virus, 161
carnation mottle virus, RNA, 959
peanut stunt virus vs. cucumber mosaic virus, 793
Poa semilatent virus, 508
potato virus X, proteins affected by enzymes, 1154
Setaria italica, St. Augustine decline of, 772
Seymour, C. P., (499), 788, (801)
Shaffer, W. H., Jr., (176)
Shain, L., 1407
Shalla, T. A., (744), 788
Shaner, G. E., (1108)
Shankar, N. K., (793)
Shaw, J. G., 789
Shear, C. B., (768)
Shepard, J. F., (788), 1154
Sherald, J. L., 671
Shigo, A. L., 256, 789, (792)
Shih, C. S., (92)
Shih, M., 789
Short, G. E., 1111
Shriner, D. S., 427
Shurtleff, M. C., (749)
Siegel, A., 789
Siegel, M. R., 630, 789, (802)
Silva, J., (11)
Simon, J. A., (787)
Simons, M. D., 1444
Sims, J. J., (1398)
Sinclair, J. B., (296), (345), (1108), (1183), (1261), (1414)
Sinclair, W. A., 500, 789
Sing, V. O., 790
Singh, R. P., (516), 790
Sinha, R. C., 50, 377
Sirex noctilio, on Pinus radiata, fungus symbiosis, 1407
Sisler, H. D., (669), (671)
Skelly, J. M., (667), (670), 671, (743)
Skotland, C. B., (1105)
Slack, D. A., (762)
Slykhuis, J. T., 508
Smalley, E. B., (845), (848)
Smiley, R. W., 86, 193
Smith, D. G., (235)
Smith, D. H., 1029
Smith, R. S., Jr., (1098)
Smith, S. H., (667), (669), 672, (672)
Smith, S. N., 273
Smith, W. H., (499), (788)
Smith, W. L., Jr., 672, 790
Smoot, J. J., (488)
smut (see under genera of)
Sneh, B., 595, 852
Snow, G. A., 790
snow mold, fungicides for, 746
Snyder, E. B., 325
Snyder, W. C., (12), (273), (731)
Sobers, E. K., 12, 485, (647), 806
sodium N-methyldithiocarbamate (see **fungicides**, specific)
soil
compaction, affecting Fusarium on bean, 1101
fumigants, Verticillium wilt of potato, 520, *[31]*
fumigation, effect on peach roots, 745
fungicide, spore survival affected by, 417
fungicides for identification of soil-borne pathogens, 287
microbial activity in, related to squash mosaic virus, 775
salinity of, related to pine tipburn, 705
subsoiling, bean root rot reduced by, 306, **308**
temperature (see **temperature**, soil-)
tillage & compaction of, effect on bean root rot, 550, **553**
volatile inhibitor from, 573
affecting seed germination, 765
characteristics of, 769
soil-borne pathogens (see also **soil microorganisms**)
antifungal substances in chitin-amended soil, 595
on beans & peas, relation to cropping practice, 1101
Calonectria vs. Cylindrocladium, 485
Fusarium solani, soil compaction effects, 306
herbicide effect on, 765
Phytophthora parasitica nicotianae, propagule density vs. disease, 474
soil microorganisms (see also **soil-borne pathogens**)
Atrazine interaction with, population, 1110
chloroneb degradation & synthesis of, 1112
relation to grape replant problems, 503
Solanum
phureja, Pseudomonas solanacearum on, resistant genes in, 1093
tuberosum (see **potato**)
Solel, Z., 500, 1007
Sommer, N. F., (1104)
sorghum, sooty stripe of, in Nebraska, 1110
Sorghum spp., Fusarium moniliforme on, symptoms of, 800
biocolor, rust of, naturally stabilized, 757
Soto, C. A., 790
Soulen, D. M., 672, (672)
southern bean mosaic virus
antiserum titer of, factors affecting, 796
on bean seed, distribution of, 387
sowthistle yellow vein virus, on Sonchus, electron microscopy in, 770
soybean
aflatoxin in, effect of DMSO on, 753
Aspergillus flavus on, aflatoxins from, 745
bacteria from healthy plants, 771
bacterial blight of
epidemiology of, 57, **60**
interaction of bacteria, 787
seedling infection, 1167, **1169**
brown stem rot of
light & age factors affecting, 1334
photoperiod effect, 782

resistance
in, evaluation criteria for, 1112
modified by virus, 1314
vs. mosaic virus infection, 792
Cephalosporium gregatum on
etiology of, 345
recovery from straw, 1362
Cercospora kikuchii on, effect of plant age, 771
double infection by mosaic & bean pod mottle viruses, 839, **841**, **843**
Fusarium moniliforme on, doubtful pathogenicity, 801
growth affected by ozone & SO_2, 763
hydroxyphaseollin in
induced by fungicides, 1113
from tobacco necrosis virus infection, 719
interaction between Heterodera & Rhizobium on, 1201, **1204**
internal stem browning of, 612
leaf rugosity of, caused by perchlorate in Chilean nitrate, 1164
Macrophomina phaseolina on
host-parasite relationships, 743
isolate variation in, 1108
phytoalexin
induced in, by Phytophthora megasperma, 439
production in, by cross-protection, 1457
Phytophthora megasperma sojae on
cross-protection against, 645
defense mechanism for, 768
enzymatic response to, 781
resistance to, electron microscopy, 670
root & stem symptoms in, 1414
proteins from, released by Sclerotium rolfsii, 668
Pseudomonas glycinea on seeds of, detection, 1075
Pythium seed rot of, resistance to, 768
seed-borne infection, Sclerotinia vs. Phomopsis on, 1261
seedlings of, effect of soil temp & Pseudomonas on, 296
systemic toxemia in, physiology of, 964, **966**
virus-infected-, acquired resistance to, 802
soybean mosaic virus
on bean, inhibitory to bean pod mottle virus, 887
bean pod mottle virus simultaneous infection, 839, **841**, **843**
brown stem rot resistance related to, 792, 1314
Spalding, D. H., (784)
Sparnicht, R. H., 1381
Spasoff, L., (778)
Sphaerotheca
fuliginea, on Cucumis, spore release in, 1099
pannosa, on rose, spore release in, 1099
Spilocaea eriobotryae, scab caused by, on Pyracantha, loquat, toyon, & kageneckia, 914
spore germination, Puccinia graminis tritici, pretreatment factors affecting, 116
Spotts, R. A., 705
Sproston, T., (493)
Spurr, A. R., (935)
Spurr, H. W., Jr., 807, 916
squash, Fusarium rot of, Thiabendazole for, 758
squash mosaic virus
cell permeability affected by, 762
soil microbial activity related to, 775
Stace-Smith, R., 791, (796)
Stachybotrys alternans, on oats, mycotoxins from, 778
Staley, J. M., (705)
Stall, R. E., (750), 791, 882
Stanghellini, M. E., (778), 791
Stanton, J. R., (670)
Staples, R. C., (502)
Starr, J. L., 1111
Statler, G. D., 866, 1112
Staub, T., (247), 722, 858
Staveley, J. R., 672, 1392
Steadman, J. R., (1107)
Steere, R. L., (494), 672
Stein, A., 1461
Steiner, G. W., (120), (339), (466)
stem-grooving virus, on apple, relation to chlorotic leaf spot virus, 585
Stemphylium
botryosum, phaseollin & pisatin degraded by, 763
loti, formamide hydro-lyase from, adaptive enzymes, 758
stem pitting disease
on peach
relation to tomato ringspot virus, 672
vs. other stone fruits, 1294, **1295**, **1296**, **1298**, **1299**, **1301**
stem rust of wheat (see **Puccinia** graminis)
Stenotaphrum secundatum
decline of, resistance to, 807
St. Augustine decline of, 772
spectral reflectance measurements of, 793
Stewart, J. L., (1105)
Stienstra, W. C., 282
Stipes, R. J., 1366
stone fruits (see **Prunus spp.**)
Story, G. E., (746)
Stouffer, R. F., (667), 672, (672)
strawberry
benomyl for diseases of, translocation in, 1183, [*32*]
fruit rot of
from Colletotrichum fragariae, 600, **601**
symptoms, 804
root rot of, pathology, 700, **701**, **703**
strawberry crinkle virus, rhabdoviruslike particles in, **491**
Stretch, A. W., (68)
Stretton, H. M., (1057)
Strickland, A., (1144)
stripe rust (see **Puccinia** striiformis)
Strobel, G. A., 339
Stucker, R. E., (781)
Stuckey, R. E., 791
Studenroth, J. C., 500
Subero, L. J., (12)
sugar beet
beet western yellows virus on, ultrastructural changes in, 1103
beet yellow stunt of, characteristics of, 161
benomyl & Thiabendazole for, movement & retention in, 1111
Cercospora beticola on
isolate variation in, 134
resistance factors, 1095
Cercospora leaf spot of, spore release in, 570
curly top virus of, method of transmission, 1217
herbicide relation to damping off, 743
nematode relationships in, histopathology, 1103
Rhizoctonia solani on
isolates pathogenic to, 202
pathological histology of, 786
sugarcane
eye spot disease of, resistance to toxin, 466
maize dwarf mosaic virus on, relation to sugarcane mosaic virus, 769
ratoon stunt of, electron microscopy, 498
seedling diseases of, in Hawaii, control, 120, **122**
on sugarcane leaves, toxin effect on cells of, 339, **341**, **342**
Thielaviopsis paradoxa on, in Puerto Rico, 773

sugarcane mosaic virus
maize dwarf mosaic virus
compared with, on grasses, 1466
mixed with, 760
relationships, on sugarcane, 769
strains of, in Puerto Rico, 773
sugar maple (see **Acer saccharum**)
sulfur dioxide (see **pollution**, air-)
Sun, M. K. C., (803), 832
sunflower (see **Helianthus annuus**)
sunflower yellows, new disease caused by Phialophora sp., 1088, **1089**, **1091**
Sullivan, F., (495)
Sulzbach, C. W., 1247
Sumner, D. R., 322, (772), 791, 807
surface charge of particles, effect on leaf inoculation, 789
Sutton, J. C., (247)
Sutton, T. V., 1369
Svoboda, W. E., 1457
sweet potato
false broomrape on, varietal reaction, 755
mercury content of, from treated roots, 804
scurf, chemical control for, 667
stem rot of, Thiabendazole for, 776
witches'-broom, mycoplasmalike organism association, 903, **907**
sweet potato little-leaf (see **sweet potato**, witches'-broom)
sweet potato russet crack virus, transmission of, 750
Swendsrud, D. P., 931
Sylvester, E. S., (491)
Szkolnik, M., 500, 791

Tachibana, H., 792, 1112, 1314
Tagetes erecta, effect of Penicillium simplicissimum on, 669
Tainter, F. H., 792
Tait, B. A., 792
Takahashi, Y., 429
Tappen, W. B., 682
Tattar, T. A., 792
Taylor, G. S., 500
Taylor, J., 792
techniques
curly top virus transmission, on sugar beet, 1217
density flotation in soil, for Verticillium microsclerotia, 766
medium for isolating Erwinia spp., 778
pH in soil, use & abuse in measurement of, 193
photography, aerial, for tree diseases, 495
propagule enumeration in soil, of Sclerotium, 545
selective medium for
Cephalosporium gramineum from soil, 783
pectolytic pseudomonads, 993
Pseudomonas glycinea, 674, [*31*]
for soil fungi, 1108
Xanthomonas campestris, 787
soil fungi, quantitative assay of Macrophomina, 1098
ultraviolet & black light for detection of infected rice seed, 1102
water balance & membrane damage, 501
temperature (see also **physiology of disease** and **physiology of microorganisms**)
Ceratocystis spp., growth effects, 499
effect on Puccinia carthami, teliospore germination in, 436
Helminthosporium maydis
on corn seedlings, 770
effect on races of, 676
Helminthosporium sorokinianum, spore germination & pathogenicity, 1133, [*32*]
onion root inhibitor to Pyrenochaeta terrestris effect, 1105
plant viruses affected by, 753
Pyricularia oryzae on rice, 1005
Pythium & Meloidogyne recovery in field soil, 819
soil-
effect on
bacterial blight of soybean, 296
onion smut, 282
Pythium root rot of cotton, 373
Phymatotrichum omnivorum, growth & survival, 828
soybean-cyst nematode, reproduction of, 762
TMV, synthesis affected by, 615
tobacco affected by tobacco ringspot virus, 1376
Tetranychus urticae, role in tobacco ringspot virus, 669
Thanatephorus cucumeris (see also **Rhizoctonia** solani)
heterokaryosis, genetics of, 1057, **1058**, **1060**
Thea sinensis, Cylindrocladium sp. on seed of, 12
Theobroma cacao, Fusarium of, 12
Thiabendazole (see **fungicides**, specific)
Thielaviopsis
basicola
spore germination in, rhizosphere acids affecting, 688
spore survival in, fungicides affecting, 417
paradoxa, on sugarcane & pineapple in Puerto Rico, 773
thiophanate-methyl (see **fungicides**, specific)
Thomas, C. A., (471), (667)
Thomas, D. L., 12, (12)
Thomas, H. E., (700)
Thomas, P. E., 954
Thompson, J. H., (1105)
Thomson, S. V., 792
Thorson, G., (783)
Thyr, B. D., 1082
Tien, M., 501
Tilletia caries, on wheat, isolation attempts, 1096
Timian, R. G., (773)
Timmer, L. W., 793
tintoxin, from Alternaria tenuis, transpiration effect, 755
tobacco
Alternaria alternata on, biological control for, 807
black shank disease of
index on soil Ca, 302
pathogenesis related to propagule density of pathogen, 474
tissue culture for resistance study, 1439
Botrytis stem rot of, benomyl for, 500
Cercospora nicotianae on, effect on leaf chemicals, 1392
Erwinia amylovora on, hypersensitivity induced, protein changes, 1429
Heterodera solanacearum on, resistance to, 778
hypersensitivity in, induced by bacteria, 766
leaf microflora of, relation to brown spot & fungicides, 916
ozone injury to, 759
ozone tolerance to, 63
Pseudomonas pisi on, factors affecting electrolyte leakage & membrane damage in host, 1327, **1328–1330**
Pseudomonas solanacearum on, hypersensitivity to, 536
resistance
to Meloidogyne & Cercospora on, 672
to 4 viruses, 668
role of potato viruses X & Y in, 760
TMV on
cell cultures of, 786
temp effect on synthesis, 615
uridine-H^3 incorporation related to kinetin concentration, 1110
virus disease of, new in North Carolina, 803
tobacco etch virus

cylindrical inclusions in, 744
on pepper
in Florida, 800
yield effect, 808
transmission
factors affecting, 502
related to particle number, 1283
tobacco mosaic virus
antifungal compound in infected bean leaves, 1111
defective coat protein in, 766
dissociation of, cation effects, 1111
ethylene effect on tobacco lesions, 786, [*31*]
interference induced by polyanions, 1461
mutation in, 745
nucleic acid components, 789
on potato, virus morphology & cytological response to, 1303, **1305–1310**
synthesis in tobacco tissue culture, 1107
on tobacco, temp effect on synthesis of, 615
transmission related to particle number, 1283
tobacco necrosis virus
on apple, pear, & apricot, isolation of, 501
strains of, from apple, properties of, 478, **479**
tobacco rattle virus
homologous interference in components of, 1109
specificity of, 779
tobacco ringspot virus
ash strain of, 1023, **1024**, **1027**
influence of host & season on components of, 195
on necrosis-prone tobacco cultivar, temp dependent, 1376, **1377**, **1378**
nontransmission by spider mite, 669
satellite of, coat protein code, 788
tobacco streak virus, on black raspberry, 1001, **1002**
Toler, R. W., (772), 793, 807
Tolin, S. A., (640), 673, 793, (812)
Tollenaar, H., 1164
Tolmsoff, W. J., 407
tomato (see also **Lycopersicon spp.**)
anthracnose of, resistance to, 660
bacterial canker of
factors affecting, 757
resistance to, 756
Botrytis cinerea on, role of plant leachates, 750
Corynebacterium michiganense on, virulence on cultivars of, 1082
curly top virus on
effect of P on, 524
resistance factor in, 954
resistance to, 564
unusual symptoms, 187, **188**
effect of fluoride on pollen & fruit of, 1247, **1251**
fusaric acid vs. ethylene injury, 501
Fusarium-infected plants, water relationships, 494
Fusarium infection of, relation of single gene resistance to localization of infection, 1256, **1258**
Fusarium oxysporum lycopersici on, use of near-isogenic lines, 1232
Fusarium wilt of, histochemistry of browning, 651
interaction
of 4 bacterial spp. in leaves of, 1120, **1124**
of Verticillium & Pratylenchus on roots of, 362
isolines of, wilt reaction to, histochemistry, 774
leafhopper feeding injuries on seedlings of, 183, **185**
new virus from Peru, 784
Peru tomato virus in, tolerance to, 764
potato spindle tuber virus on, Mn effect, 516, **518**
root knot of, organic mulch effect, 767
Septoria lycopersici on, resistance vs. light & peroxidase, 746
soft rot of, tolerance of cultivars to, 1085
southern blight of, control by Trichoderma, 442, **445**
Verticillium albo-atrum on, 12
Xanthomonas spp. on, pathogenic vs. nonpathogenic spp., 329
zonate leaf spot of, 758
tomato aspermy virus, properties of, 791
tomato big bud, characterization of, 1101
tomato ringspot virus
on blueberries, 1104
properties of, compared with Prunus stem-pitting virus, 750
relation to stem pitting in peaches, 672
toxin (see also **phytoalexin**)
helminthosporoside, effect on ultrastructure of sugarcane leaf cells, 339, **341**, **342**
from Pseudomonas phaseolicola, purification of, 782
victorin ultrastructure of treated oat leaves, uranyl salt affecting, 755
Tomlinson, H., (63)
Tompkins, D. R., (287)
Tosic, M., 1466
Tremaine, J. H., (791)
triarimol (see **fungicides**, specific)
Trichoconis padwickii, detection on rice seed, by ultraviolet light, 1102
Trichoderma spp., methyl bromide effect on, in Armillaria-infected citrus root, 781
harzianum
Sclerotium rolfsii controlled by
in lupine, 808
in lupine, tomato, & peanut, 442
viride, effect on grape replant problems, 503
Trifolium spp., histoid enation disease of, 745
pratense
bean yellow mosaic virus on, clones of, 754
clover root borer on, 496
phytoalexins from infection by Helminthosporium turcicum, 235
repens, viruses of, assay technique for, 801
Trione, E. J., 1096
triphenyltin (see **fungicides**, specific)
tristeza, on citrus leaves, simultaneous infection with mycoplasma, 663, **664**, **665**
Triticum aestivum (see **wheat**)
Troutman, J. L., 793
Trujillo, E. E., 793
Trujillo, G. E., (489)
Tsao, P. H., (765)
Tu, J. C., (77), (366)
Turner, N. C., 63, (494), 501
turnip mosaic virus, on Brassica campestris, interaction with Fusarium oxysporum, 1424
turnip yellows virus, serological relation to beet western yellows virus, 1274
Tweedy, B. G., (765), 793
Twiddy, W., 794
Tylenchorhynchus dubius, relation to Fusarium blight of bluegrass, 1311, **1312**, **1313**
Typhula sp., on wheat, effect of fall clipping, 1108
idahoensis
extracellular enzyme relationships of, 1105
sclerotia as inoculum, 1040
itoana, on grass, fungicides for, 746

Uchytil, T. F., (755)
Ulmus spp., Ceratocystis ulmi on, resistance to, 845, 939
americana
Ceratocystis ulmi on
fine structure of, 1253, **1254**, **1255**

physiological changes in infected tissue, 457, 909
resistance to, 789
elm mosaic virus of, in Iowa, characterization of, 987, **988, 991**
pumila, hybrids of, response to Ceratocystis ulmi, 848
ultrastructure (see also **electron microscopy**)
in Aphanomyces euteiches, in spore formation, 149, **151–158**
aphid
infected with brome mosaic virus, 429, **432**
infected with TMV, 429, **431**
beet western yellows virus on beet leaf cells, 1103
Ceratocystis ulmi in elm wood, 1253, **1254, 1255**
clover phyllody agent, on aster, 377, **382**
corn & Johnson grass root, maize dwarf mosaic virus infection, 1109
corn & petunia pollen, ozone effects, 495
Criconemoides curvatum, feeding apparatus of, 501
elm mosaic virus, characterization of, 987, **991**
Fomes annosus, 762
Fusarium oxysporum, Woronin bodies in, 797
Fusarium oxysporum lycopersici, microbodies of, 673, 1045, **1046, 1048–1050**
Helminthosporium maydis
on corn, lesions, race T, 747
corn mesophyll cells, 798
races O & T, 749
mycoplasmalike organisms in Vinca rosea, temp effect, 1453, **1454, 1455**
phenol-containing cells in banana & tomato, 779
Pythium aphanidermatum, on lettuce roots, 751
sugarcane leaf cells affected by toxin, 339, **341, 342**
toxin treated onion seedlings, 763
Uromyces phaseoli on Phaseolus vulgaris, 27, **28, 30, 32, 34, 36**, [*31*]
victorin-treated oat leaves, uranyl salt effect, 755
Vigna sinensis, rust-infected-, 27, **28, 30, 32, 34, 36**, [*31*]
virus in orchid, 762
Upper, C. D., 794, (803)
Uredinales, characteristics of, in Mexico, 763
Urocystis colchici, on onion, factors affecting infection, 282
Uromyces
phaseoli
on Phaseolus vulgaris, dark therapy of, 1139, **1140**
ribosomes of, 502
phaseoli vignae, on bean, ultrastructure of, 27, **28, 30, 32, 34, 36**, [*31*]
Ustilago
maydis
antimycin A & azide-tolerance in, 671
extranuclear inheritance vs. mycovirus transmission in, 753
killer factor in, heterokaryon transfer, 494
triarimol for, mode of action, 671
striiformis
on Agrostis palustris
benomyl for, 533
effect in inflorescence, 583
Uyemoto, J. K., 478, (495), 501, (584)

Vaccinium corymbosum (see **blueberry**)
Vakili, N. G., 794
Van Alfen, N. K., 794
Van Arsdel, E. P., 794, 807
van den Heuvel, J., 794
van der Zwet, T., (39), (355), 795
Van Etten, H. D., (794), 795
Van Etten, J. L., (760), 795
Van Gundy, S. D., 191
Van Sambeek, J. W., (290)
Vargas, J. M., Jr., 795, (1112), 1311
Varney, E. H., (502)
Vaughan, E. K., (1103), (1104)
Veech, J. A., (651), (774), 796
Venturia inaequalis
ascospore reaction to dodine, 782
dodine tolerance
in conidia & hyphae of, 496
inheritance of, 799
esterase activity in, histochemical demonstration of, 1242
hypersensitivity in apple, 780
Verticillium spp.
antigens of, common to cotton varieties, 230
pathogenic strains of, detection, 796
variability in, diploidization & gene repression effects, symposium, 407
albo-atrum
on cotton
inoculum density relation, 901
phytoalexins in resistance, 1402
resistance to, 798
role of endopolygalacturonase, 498
susceptibility increased by dicofol, 780
vergosin & hemigossypol produced in, 1398
weed control relation to, 582
microsclerotia of, in soil
assessment of, 715
separation from, 766
microsclerotial viability in, 744
on potato, control by fumigation & burning, 520, [*31*]
Pratylenchus penetrans interaction with, on tomato roots, 362
on tomato varieties, 12
dahliae
propagule concentration in, 754
on sunflower, losses from, 764
malthousei, pathogenic to mushrooms, 498
Vicia
faba
broad bean mottle virus of, protein synthesis in, 771
crown gall of, RNA polymerase activity in, 498
Phytophthora megasperma on, phytoalexins from, 1365
villosa, Pseudomonas syringae on, survival of, 762
victorin (see **toxin**)
Vigna sinensis
bacteria on, seedling reaction, 770
cowpea chlorotic mottle virus on, role of Mn in disease, 1206
internal stem browning of, by Neocosmospora vasinfecta, 612
rust on, ultrastructure of host, 27, **28, 30, 32, 34, 36**, [*31*]
Villalon, B., 12, 808
Vinca rosea, mycoplasmalike organisms in, temp effects on ultrastructure, 1453, **1454, 1455**
Virola spp., decay resistance of, in Brazil, 784
viruses (see also by common name and under hosts)
antibody production for icosahedral viruses, frogs used for, 673
from cactus to wild plant, 97
dilution assays of, statistical analysis in, 366
ectodesmata role, 754
electron microscopy in potato virus, 77, **79, 82, 84**
growth affected by temp, 753
immunodiffusion for, role of high pH-ammonia agar, 1214

immuno-specific grids for electron microscopy of, 753
TMV-like infection from oak leaves, 313
transmission associated with particle number, 1283
Vojtik, F. C., (794)
Von Broembsen, S., 1106

Wade, E. K., (1111)
Wainwright, S. H., 1337
Walker, H. L., 1283
Walker, J. T., 795, 808
Walkey, D. G. A., 796
Wallin, J. R., 391, 570
Walters, H. J., 125, 808
Walters, R. S., (789)
Wang, S. C., 460, 796
Ward, J. C., 796
Wargo, P. M., 1278
Waters, J. E., (715)
Waterworth, H. E., 695, (784), 796, 959
Watson, A. G., 12
Watson, R. D., 796
Weathers, L. G., (781), (799), (1105)
Weaver, D. J., (754)
Webber, A. J., Jr., 673
Weber, D. J., (763), 797
Webster, R. K., (20)
Weete, J. D., 797
Wehunt, E. J., (745)
Weigle, C. G., (310)
Weihing, J. L., (1111)
Weinhold, A. R., (264), 278, 797, (1347)
Wells, H. D., 442, 808
Wells, J. C., (1227)
Wells, J. M., 129
Wells, T. R., 797, 1238
Welty, R. E., (916)
Wen, G.-Y., 501
Wergin, W. P., 673, (743), 797, 1045
Western X-disease, temp effect in leafhopper, 452
wetwood, on Abies concolor, bacterium association, 384
wheat
barley yellow dwarf virus on
physiological factors, 587
tissue physiology effects, 290
Cephalosporium gramineum on, seedling colonization vs. symptoms, 1013, **1016**
diseases of, detected & identified by aerial photography, 1109
Erysiphe graminis on, appressoria vs. cuticle, 708, **712**
Fusarium foot rot of, soil chemicals for, 86
leaf necrosis from Pseudomonas syringae, 1110
leaf rust resistance in, genetic analysis, 1112
Poa semilatent virus on, 508, **510**
Puccinia graminis tritici on, host gene expression & interaction to, factors affecting, 1171
Puccinia recondita on, genetic analysis of resistance, 866
Puccinia recondita tritici on
disease prediction in, 947
losses from, 944
Puccinia striiformis on, epidemiology, 668
Pyrenophora trichostoma
on, propagules of, 627, **628**
vs. Leptosphaeria avenaria, on leaves, 765
snow mold of
enzyme relationships of pathogens, 1105
fall clipping effects, 1108
stem rust of, biochemical studies in, symposium, 392
take-all of, N applications for, 434
Tilletia caries on, isolation attempts, 1096
uredospore dispersal in, **70**
Wheeler, H., 798, 808
Wheeler, J. E., 798, 828
Whitcomb, R. F., (494)
White, J. A., (749)
White, J. C., 296, (743), (1183)
White, T. J. A., 798
Whiteside, J. O., 260
Wiese, M. V., (783), 1013, 1112
Wilbur, W., 567
Wilcox, W. W., 384
Wilcoxson, R. D., 798
wild cucumber mosaic virus, host range & properties, 125
Wilhelm, S., 700, 798
Williams, A. S., (808)
Williams, E. B., (756), (777), (1242)
Williams, P. H., 247, (722), (858)
Wilson, C. L., 140, (1253)
Wilson, D. M., 501, 798
Wilson, E. E., (303), 349
Windsor, I. M., 1112
Witcher, W., (803)
witches'-broom, on Salix rigida, mycoplasmalike bodies in, 826, **827**
Wolanski, B. S., (497)
Wolf, J. C., 937
Woltz, S. S., (756), 799
wood decay
detection by electric current in trees, 792
resistance of 6 spp. in Brazil, **784**
Wood, F. A., (14), (319), (494), 501
Wood, H. A., (493), (748), (753), (823)
wood-rotting fungi
in oak, inhibited by ellagitannins, 620
pathogenesis affected by enzymes, 100
Worley, J. F., (494), (753)
Worley, R. E., (792), (805)
wound tumor virus, increase in leafhopper, cell monolayer assays, 784
Wuest, P. J., (498), 1470
Wyllie, T. D., (743)
Wynn, W. K., (802), (1032)

Xanthomonas spp.
cell wall-degrading enzymes from, 779
relation to Pseudomonas fluorescens in bean & tomato leaves, 1120, **1124**
campestris
on cabbage
factors affecting lesion development, 722
inheritance of resistance to, 247
soil amendments affecting, 800
symptoms associated with fluorescing materials, 858, **861–863**
isolation medium for, 787
carotae, on carrot, first Wisconsin observation, 1111
oryzae
on rice, in Asia, 11
rice yield reduced by, 670
pelargonii, on Pelargonium spp., histopathology of, 1337, **1339, 1341–1343, 1345**
phaseoli
on bean, 11
on bean & tomato leaves, symptom development in, 329, **331**
on bean varieties, nonsystemic to, 761
vesicatoria
on bean & tomato leaves, symptom development in, 329, **331**

on pepper leaves, NH_3 toxicity, 882
in pepper, susceptibility induced in, 791
serology of, 750
tomato strain of, in pepper, 752
Xiphinema
americanum, vector for Prunus stem pitting, 667
chambersi, on sweetgum, pathogenicity of, 333, **335**
index, methyl bromide fumigation for, 191

Yang, C. Y., (788), 808
Yang, S. L., 708, 1219
Yaniv, Z., 502
Yarwood, C. E., (313), 799, 1139
Yates, W. E., (781)
yellows disease, characterization of, in Australia, 1101
Yilmaz, M., 502
Yoder, K. S., 799
Yoder, O. C., 799

Zabbia, A. J., Jr., (630)
Zahand, J. P., (789)
Zaitlin, M., (766), (789)
Zaki, A. I., (768), 1398, 1402
Zelcer, A., 1453
Zentmyer, G. A., (785), 799
Zettler, F. W., (804), (806)
Zeyen, R. J., (745), (783)
Zimmer, D. E., 800
Zink, F. W., 1141
Zittler, T. A., 800
Zoller, B. G., (779), 800
Zucker, M., (998)
Zuckerman, B. M., 1228
Zummo, N., 800
Zygocactus sp., virus on, characterization of, 1103

ERRATUM, VOLUME 61

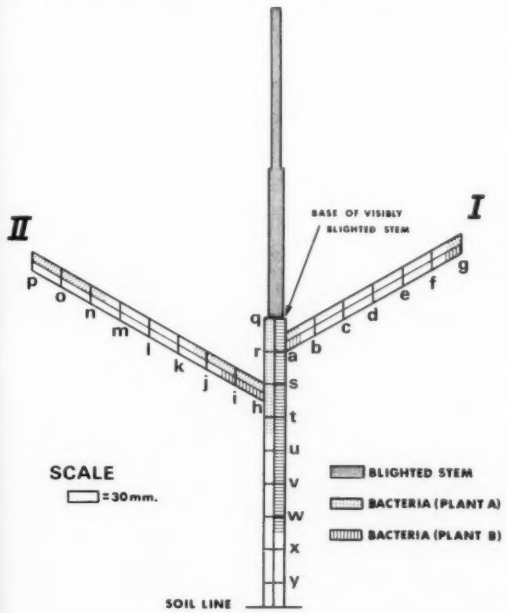
Page 1456, column 2, add line at bottom "were inoculated on one of the following days: 23"; page 1457, column 1, line 3, substitute "within" for "with"; Table 1, delete bracket between columns 6 and 7.

ERRATA, VOLUME 62

Page 11, column 2, abstract by Englehard, line 2, substitute "Engelhard" for "Englehard".

Page 37, column 2, line 24, substitute "Even if some toxic material were present" for "Even when some toxic material was present".

Page 41, substitute Fig. 1, below, for that printed.



Page 521, column 1, line 37, substitute "187 liters/hectare" for "13.05 liters/hectare"; line 38, substitute "46.7 liters/hectare" for "3.26 liters/hectare"; line 42, substitute "280.5 liters/hectare" for "19.58 liters/hectare"; and in Table 1, footnote a, substitute "187 + 46.7 liters/hectare" for "13.05 + 3.26 liters/hectare".

Page 522, Tables 2 and 3. In footnote a of each, substitute "187 + 46.7 liters/hectare" for "13.05 + 3.26 liters/hectare".

Page 523, Table 4. In footnote a, substitute "187 + 46.7 liters/hectare" for "13.05 + 3.26 liters/hectare"; and in footnote d, substitute "280.5 liters/hectare" for "19.58 liters/hectare".

Page 675, column 2, line 47, substitute "exploratory" for "explanatory".

Page 755, column 1, abstract by Dubin and English, line 3, substitute "W. H. English" for "H. English".

Page 786, column 1, abstract by Ross and Pritchard, line 7, substitute "at 1-5 ppm" for "at 2-6 ppm"; line 8, substitute "or 5-80 ppm" for "or 6-80 ppm".

Page 796, column 1, abstract by Veech and Mace, line 2, substitute "J. A. Veech" for "J. V. Veech".

Fig. 1. Schematic presentation of two Jonathan apple trees (A and B) (whips), each showing two apparently healthy side shoots I and II, developed from axillary buds after visible blight stopped progressing in the main stem. Letters indicate sites tested for presence of internal *Erwinia amylovora*.

Page 799, column 1, abstract by Yarwood and Gardner, line 9, substitute "Navarretia squarrosa" for "Navarretia squarrose"; line 10, substitute "E. trina" for "E. polygoni".

Page 899, column 2, caption for Fig. 1, lines 2 and 3, substitute these magnifications: "(× 340)", "(× 590)", "(× 620)" for "(× 540)", "(× 850)", "(× 1,000)".

Page 982, column 1, Fig. 1, turn 180 degrees.

Page 1102, column 1, abstract by Chuaiprasit et al., line 4, substitute "P. Neergaard" for "P. Neergarrd".

Page 1133, column 1, line 18, substitute "creeping bentgrass" for "creeping bluegrass"; lines 36, 37, and 38, substitute "on 4% Bacto agar in double distilled water and transferred to V-8 juice agar (20% [v/v] . . ." for "on 4% Bacto juice agar (20% [v/v] V-8 juice and 4% Bacto agar in double distilled water)".

Page 1184, Fig. 1, change the numbers on the strawberry diagram from: 5, 6, 7, 8, 15, 16, 17, 18, 19, 21, 22, 23, 24, and 25 to read: 7, 5, 8, 6, 17, 18, 21, 19, 22, 23, 24, 25, 16, and 15, respectively.

Page 1210 and October Table of Contents, substitute "G. H. Saits" for "G. H. Svits"; in Table of Contents, following page 1214, add "A new method of mechanically transmitting curly top virus . . . . . D. L. MUMFORD . . . . 1217".

Nat Sci
QK
1
P6

Phytopathology

An International Journal

Official Organ of

THE AMERICAN PHYTOPATHOLOGICAL SOCIETY

VOLUME 62

JANUARY-DECEMBER 1972

Editor-in-Chief
ROBERT AYCOCK

Senior Editors
PAUL NELSON
A. R. WEINHOLD
R. L. MILLAR
T. KOSUGE

Associate Editors

C. H. BECKMAN
R. J. COOK
M. E. CORDEN
P. R. DAY
O. J. DICKERSON
R. S. DICKEY
B. DOUPNIK, JR.
E. ECHANDI
J. W. ECKERT
B. Y. ENDO
J. C. HANCOCK, JR.
W. W. HARE
T. T. HEBERT
R. B. HINE
C. S. HODGES, JR.
J. A. HOFFMANN
B. W. KENNEDY
C. W. KUHN
H. H. LUKE
F. L. LUKEZIC
C. A. MARTINSON
D. E. MATHRE
D. P. MAXWELL
P. R. MILLER
M. R. NELSON
A. O. PAULUS
T. P. PIRONE
D. E. PURCIFULL
R. A. REINERT
A. E. RICH
R. A. SCHMIDT
C. G. SHAW
R. T. SHERWOOD
J. T. SLYKHUIS
R. E. STALL
R. C. STAPLES
G. STROBEL
D. C. TORGESON
P. H. WILLIAMS
P. J. WUEST

Business Manager
R. J. TARLETON

CONTENTS OF VOLUME 62, 1972

No. 1–JANUARY

Author's Guide 1
Ruth Allen Award 5
Fellows of The American Phytopathological Society 7
Abstracts of the 1970 Annual Meeting of the Caribbean Division of The American Phytopathological Society 11
The relative susceptibility of eighteen coniferous species to ozone ..... D. D. DAVIS and F. A. WOOD 14
Identification of strains and inheritance of pathogenicity in Phytophthora capsici ... F. J. POLACH and R. K. WEBSTER 20
Ultrastructure of host and nonhost reactions to cowpea rust ..... M. C. HEATH 27
Recovery of Erwinia amylovora from symptomless stems and shoots of Jonathan apple and Bartlett pear trees
H. L. KEIL and T. VAN DER ZWET 39
Effect of curly top disease on uptake, transport, and compartmentation of calcium
N. J. PANOPOULOS, G. FACCIOLI, and A. H. GOLD 43
Uptake and persistence of oxytetracycline in aster plants and vector leafhoppers in relation to inhibition of clover phyllody agent ..... R. C. SINHA and E. A. PETERSON 50
Bacterial blight of soybeans: epidemiology of blight outbreaks ..... G. C. DAFT and C. LEBEN 57
Stomatal conductance, fleck injury, and growth of tobacco cultivars varying in ozone tolerance
N. C. TURNER, S. RICH, and H. TOMLINSON 63
Fungi associated with blueberries held at various storage times and temperatures
R. A. CAPPELLINI, A. W. STRETCH, and J. M. MAIELLO 68
Gradients in horizontal dispersal of cereal rust uredospores ..... A. P. ROELFS 70
Light and electron microscopy of potato virus M lesions and marginal tissue in red kidney bean .. C. HIRUKI and J. C. TU 77
Fusarium foot rot of wheat and peas as influenced by soil applications of anhydrous ammonia and ammonia-potassium azide solutions ..... R. W. SMILEY, R. J. COOK, and R. I. PAPENDICK 86
The quantitative relationship between late blight of potato and loss in tuber yield
W. C. JAMES, C. S. SHIH, W. A. HODGSON, and L. C. CALLBECK 92
Distribution of cactus viruses in wild plants ..... M. CHESSIN and D. LESEMANN 97
Production of extracellular hydrogen peroxide and peroxidase by wood-rotting fungi ..... J. W. KOENIGS 100
Chemotherapy of aster yellows: tetracycline-hydrochloride uptake by healthy and diseased plants
M. KLEIN, R. J. FREDERICK, and K. MARAMOROSCH 111
Effect of pretreatment with stimulator and water vapors on subsequent germination and infectivity of uredospores of Puccinia graminis var. tritici ..... R. C. FRENCH and M. D. GALLIMORE 116
Four sugarcane seedling diseases in Hawaii: causal agents, control, and a selective medium for isolation
R. S. BYTHER and G. W. STEINER 120
Host range and some properties of Desmodium yellow mottle virus ..... H. J. WALTERS and H. A. SCOTT 125
Heated wax-emulsions with benomyl and 2,6-dichloro-4-nitroaniline for control of postharvest decay of peaches and nectarines ..... J. M. WELLS 129
Variation among isolates of Cercospora beticola from sugar beet ..... E. G. RUPPEL 134
Factors affecting sporulation and infection by the blueberry stem canker fungus, Botryosphaeria corticis
R. D. MILHOLLAND 137
Mycoplasmalike bodies associated with elm phloem necrosis ..... C. L. WILSON, C. E. SELISKAR, and C. R. KRAUSE 140
Phytophthora foot rot of black pepper in Brazil and Puerto Rico
R. ALCONERO, F. ALBUQUERQUE, N. ALMEYDA, and A. G. SANTIAGO 144
The ultrastructure of Aphanomyces euteiches during asexual spore formation ..... H. C. HOCH and J. E. MITCHELL 149
Beet yellow stunt, a potentially destructive virus disease of sugar beet and lettuce ..... J. E. DUFFUS 161
Physiologic specialization and epidemiology of wheat stem rust in East Africa
D. E. HARDER, G. R. MATHENGE, and L. K. MWAURA 166
Replanting of vineyards and its relationship to vesicular-arbuscular mycorrhiza
D. R. DEAL, C. W. BOOTHROYD, and W. F. MAI 172
Leaf damage as a predisposing factor in the infection of apple shoots by Erwinia amylovora
J. E. CROSSE, R. N. GOODMAN, and W. H. SHAFFER, JR. 176
Curly top viruliferous and nonviruliferous leafhopper feeding effects upon tomato seedlings
D. E. GARDNER and O. S. CANNON 183
Unusual symptomatology of curly top in susceptible-resistant grafted tomato plants D. E. GARDNER and O. S. CANNON 187

PHYTOPATHOLOGICAL NOTES
Response of Meloidogyne incognita, Xiphinema index, and Dorylaimus sp. to methyl bromide fumigation
S. D. VAN GUNDY, D. MUNNECKE, J. BRICKER, and R. MINTEER 191

No. 2–FEBRUARY

Letter to the Editor: Use and abuse of the soil pH measurement ..... R. W. SMILEY and R. J. COOK 193
Influence of host and seasonal variation on the components of tobacco ringspot virus
J. L. LADIPO and G. A. DE ZOETEN 195
Correlation of cultural characters and source of isolates with pathogenicity of Rhizoctonia solani from sugar beet
E. G. RUPPEL 202
Deterioration of stored pea seed by Aspergillus ruber: extraction and properties of a toxin ..... G. E. HARMAN 206
Deterioration of stored pea seed by Aspergillus ruber: evidence for involvement of a toxin . . G. E. HARMAN and G. NASH 209
Ceratocystis canker of aspen ..... T. E. HINDS 213
Insect transmission of Ceratocystis species associated with aspen cankers ..... T. E. HINDS 221
Influence of blister rust on inorganic solute concentrations in western white pine ..... N. E. MARTIN 226
Common antigens among varieties of Gossypium hirsutum and isolates of Fusarium and Verticillium species
R. CHARUDATTAN and J. E. DE VAY 230
Separation and identification of two pterocarpanoid phytoalexins produced by red clover leaves
V. J. HIGGINS and D. G. SMITH 235
Studies on the mechanism of action of 2-aminobutane ..... J. A. BARTZ and J. W. ECKERT 239
Inheritance of resistance in cabbage to black rot ..... P. H. WILLIAMS, T. STAUB, and J. C. SUTTON 247
Preparation and properties of maize dwarf mosaic virus ribonucleic acid ..... D. R. PRING and W. G. LANGENBERG 253
Successions of microorganisms and patterns of discoloration and decay after wounding in red oak and white oak
A. L. SHIGO 256
Histopathology of citrus greasy spot and identification of the causal fungus ..... J. O. WHITESIDE 260
Fatty acids and naturally occurring plant lipids as stimulants of rhizomorph production in Armillaria mellea
A. R. MOODY and A. R. WEINHOLD 264
Dynamics of symptom development of the seed-borne pea fizzletop virus ..... R. O. HAMPTON 268
Germination of Fusarium oxysporum chlamydospores in soils favorable and unfavorable to wilt establishment
S. N. SMITH and W. C. SNYDER 273
Influence of exogenous nutrition on virulence of Rhizoctonia solani
A. R. WEINHOLD, R. L. DODMAN, and T. BOWMAN 278
Effect of inoculum density, planting depth, and soil temperature on Urocystis colchici infection of onion
W. C. STIENSTRA and M. L. LACY 282
Selective soil fungicides as an aid in the identification of soil-borne plant pathogens
W. A. HAGLUND, R. L. GABRIELSON, and D. R. TOMPKINS 287
Differential effects of barley yellow dwarf virus on the physiology of tissues of hard red spring wheat
S. G. JENSEN and J. W. VAN SAMBEEK 290

PHYTOPATHOLOGICAL NOTES
Catalase activity of virulent and avirulent strains of Pseudomonas solanacearum
M. K. ABO-EL-DAHAB and M. A. EL-GOORANI 294
Effect of soil temperature and Pseudomonas glycinea on emergence and growth of soybean seedlings
J. C. WHITE, J. F. NICHOLSON, and J. B. SINCLAIR 296
Mycoplasmalike bodies associated with lethal yellowing disease of coconut palms
B. PLAVSIC-BANJAC, P. HUNT, and K. MARAMOROSCH 298
^{35}Sulfur diffusion from bean leaves in relation to growth of Pseudomonas phaseolicola
R. D. MOBLEY, M. N. SCHROTH, and D. C. HILDEBRAND 300
Regression of tobacco black-shank index on soil calcium ..... R. R. KINCAID, F. G. MARTIN, and F. M. RHOADS 302

No. 3–MARCH

Byron R. Houston, 1914-1970 ..... L. D. LEACH and E. E. WILSON 303
Edmund Brian Lambert, 1897-1971 ..... G. C. PAPAVIZAS and A. E. KEHR 304
John R. Large, 1901-1971 ..... P. DECKER 305
Counteracting bean root rot by loosening the soil ... D. W. BURKE, D. E. MILLER, L. D. HOLMES, and A. W. BARKER 306
Two strains of Pseudomonas eriobotryae isolated from loquat cankers in California
M. LAI, C. W. MORIN, and C. G. WEIGLE 310

Transmission of virus from oak leaves fractionated with Sephadex ..... F. NIENHAUS and C. E. YARWOOD 313

Epidemiology of Botrytis blight of macadamia racemes ..... J. E. HUNTER, K. G. ROHRBACH, and R. K. KUNIMOTO 316

Interpretation of microclimate data in relation to basidiospore release by Fomes annosus ..... R. A. SCHMIDT and F. A. WOOD 319

Effect of freezing injury on head rot and spot of cabbage ..... D. R. SUMNER 322

Breeding longleaf pines for resistance to brown spot needle blight ..... E. B. SNYDER and H. J. DERR 325

Comparative growth of Xanthomonas phaseoli and Xanthomonas vesicatoria and development of symptoms in bean and tomato leaves ..... S. HSU and R. S. DICKEY 329

Pathogenicity of Xiphinema chambersi on sweetgum ..... J. L. RUEHLE 333

Influence of Pratylenchus brachyurus on the incidence of Fusarium wilt in cotton ... R. E. MICHELL and W. M. POWELL 336

Ultrastructure of cells in toxin-treated and Helminthosporium sacchari-infected sugarcane leaves ..... G. A. STROBEL, W. M. HESS, and G. W. STEINER 339

Etiology of Cephalosporium gregatum in soybean ..... R. W. SCHNEIDER, J. B. SINCLAIR, and L. E. GRAY 345

Metabolic behavior of Pseudomonas savastanoi isolates from olive and oleander on certain carbohydrate and amino substrates ..... E. E. WILSON, M. G. HESKETT, M. L. JOHNSON, and T. KOSUGE 349

Aerial strands of Erwinia amylovora: structure and enhanced production by pesticide oil ..... H. L. KEIL and T. VAN DER ZWET 355

Interaction of Verticillium albo-atrum and the root lesion nematode, Pratylenchus penetrans, in tomato roots at controlled inoculum densities ..... J. J. CONROY, R. J. GREEN, JR., and J. M. FERRIS 362

Statistical analysis of some dilution assays of maize dwarf mosaic virus ..... D. JOWETT, R. E. FORD, and J. C. TU 366

The role of Pratylenchus penetrans in the root rot complex of canning pea ..... P. O. OYEKAN and J. E. MITCHELL 369

Effect of soil treatment, soil temperature, and plant age on Pythium root rot of cotton ..... R. W. RONCADORI and S. M. MC CARTER 373

Uptake and persistance of oxytetracycline in aster plants and vector leafhoppers in relation to inhibition of clover phyllody agent ..... R. C. SINHA and E. A. PETERSON 377

PHYTOPATHOLOGICAL NOTES

Bacterium associated with wetwood in white fir ..... W. W. WILCOX and N. D. OLDHAM 384

The nature of control of Rhizoctonia solani by pentachloronitrobenzene in soil ..... W. H. KO and M. K. ODA 385

Distribution of southern bean mosaic virus in the seed of Phaseolus vulgaris ..... J. G. MC DONALD and R. I. HAMILTON 387

Germination of basidiospores of Cronartium comandrae on rocks and vegetation ..... R. G. KREBILL 389

No. 4—APRIL

Irving E. Melhus, 1881-1969 ..... J. R. WALLIN 391

Symposium on application of genetics to the study of disease physiology 392

The use of near-isogenic lines in biochemical studies of the resistance of wheat to stem rust ..... J. M. DALY 392

Genetics and physiology of primary infection by Erysiphe graminis ..... A. H. ELLINGBOE 401

Diploidization and heritable gene repression-derepression as major sources for variability in morphology, metabolism, and pathogenicity of Verticillium species ..... W. J. TOLMSOFF 407

Horizontal resistance of red rustproof oats to crown rust ..... H. H. LUKE, W. H. CHAPMAN, and R. D. BARNETT 414

Survival of endoconidia and chlamydospores of Thielaviopsis basicola as affected by volatile soil fungicides
G. C. PAPAVIZAS and J. A. LEWIS 417

Effects of cultural practices and biotic soil factors on Fomes annosus ..... W. D. KELLEY and E. A. CURL 422

Rapid determination of chloride content of vegetation for assessment of air pollution injury from hydrogen chloride
D. S. SHRINER and N. L. LACASSE 427

Tobacco mosaic and brome mosaic viruses in aphids ..... Y. TAKAHASHI and G. B. ORLOB 429

Spring versus fall nitrogen fertilization and take-all of spring wheat ..... D. M. HUBER 434

Effect of host plant materials and temperature on germination of teliospores of Puccinia carthami .... J. M. KLISIEWICZ 436

Hydroxyphaseollin production by various soybean tissues: a warning against use of "unnatural" host-parasite systems
N. T. KEEN and R. HORSCH 439

Efficacy of Trichoderma harzianum as a biocontrol for Sclerotium rolfsii
H. D. WELLS, D. K. BELL, and C. A. JAWORSKI 442

Electron microscopy of intracellular radish mosaic virus ..... Y. HONDA and C. MATSUI 448

Temperature and transmission of the Western X-disease agent by Colladonus montanus ..... D. D. JENSEN 452

Net photosynthesis, growth, and transpiration in American elm seedlings as influenced by Dutch elm disease and plant-water stress ..... B. R. ROBERTS 457

Some biochemical factors associated with the infection of cotton fruit by Diplodia gossypina
S-Y. WANG and J. A. PINCKARD 460

Use of helminthosporoside to select sugarcane seedlings resistant to eye spot disease
R. S. BYTHER and G. W. STEINER 466

Relationship of safynol and dehydrosafynol accumulation to Phytophthora resistance in safflower
E. H. ALLEN and C. A. THOMAS 471

Population density of Phytophthora parasitica var. nicotianae in relation to pathogenesis and season
R. A. FLOWERS and J. W. HENDRIX 475

Properties of tobacco necrosis virus strains isolated from apple ..... J. K. UYEMOTO and R. M. GILMER 478

Strain differences in Fusarium oxysporum causing diseases of Douglas-fir seedlings .... W. J. BLOOMBERG and W. LOCK 481

Morphology and pathogenicity of Calonectria floridana, Calonectria kyotensis, and Calonectria uniseptata
E. K. SOBERS 485

PHYTOPATHOLOGICAL NOTES

Germination of Penicillium digitatum spores as affected by solutions of volatile components of citrus fruits
P. L. DAVIS and J. J. SMOOT 488

Monroe bean as a local lesion host for bean common mosaic virus ..... A. W. SAETTLER and G. E. TRUJILLO 489

Rhabdoviruslike particles associated with strawberry crinkle virus
J. RICHARDSON, N. W. FRAZIER, and E. S. SYLVESTER 491

No. 5–MAY

Abstracts of the 1971 Annual Meeting of the Northeastern Division of The American Phytopathological Society 493

A survey of biotic relationships in grape replant situations ..... D. R. DEAL, W. F. MAI, and C. W. BOOTHROYD 503

Poa semilatent virus from native grasses ..... J. T. SLYKHUIS 508

Movement of benomyl in field soils as influenced by acid surfactants ..... R. E. PITBLADO and L. V. EDGINGTON 513

Enhancement of diagnostic symptoms of potato spindle tuber virus by manganese ..... C. R. LEE and R. P. SINGH 516

Effect of annual soil fumigation and preharvest vine burning on Verticillium wilt of potato
G. D. EASTON, M. E. NAGLE, and D. L. BAILEY 520

Uptake and translocation of phosphorus in healthy and curly top-diseased tomatoes
G. FACCIOLI, N. J. PANOPOULOS, and A. H. GOLD 524

A peach isolate of Prunus necrotic ringspot virus ..... E. L. CIVEROLO and S. M. MIRCETICH 529

Effect of benomyl on eradication of Ustilago striiformis from Agrostis palustris and on plant growth
P. W. ROBINSON and C. F. HODGES 533

Prevention of the hypersensitive reaction in tobacco by proteinaceous constituents of Pseudomonas solanacearum
L. SEQUEIRA, S. AIST, and V. AINSLIE 536
Bacterial leaf spot of watermelon caused by Pseudomonas lachrymans ..... D. L. HOPKINS and N. C. SCHENCK 542
Isolation and enumeration of propagules of Sclerotium cepivorum from soil ..... G. C. PAPAVIZAS 545
Distribution of Fusarium solani f. sp. phaseoli and bean roots in relation to tillage and soil compaction
D. W. BURKE, L. D. HOLMES, and A. W. BARKER 550
Induced resistance in alfalfa to Corynebacterium insidiosum by prior treatment with avirulent cells
R. B. CARROLL and F. L. LUKEZIC 555
An analysis of plant breeding procedures for obtaining curly top resistance in tomato... P. E. MOSER and O. S. CANNON 564
Seasonal development of Armillaria root rot of peach as influenced by fungal isolates
W. WILBUR, D. E. MUNNECKE, and E. F. DARLEY 567
The increase of Cercospora leaf spot in sugar beets and periodicity of spore release .... J. R. WALLIN and D. V. LOONAN 570
The nature of a volatile inhibitor from certain alkaline soils ..... W. H. KO and F. K. HORA 573
Growth in culture and pathogenicity of Phoma strasseri to peppermint ..... H. A. MELOUK and C. E. HORNER 576

PHYTOPATHOLOGICAL NOTES

Bruising of sweet cherries resulting in internal browning and increased susceptibility to fungi
J. M. OGAWA, E. BOSE, B. T. MANJI, and W. R. SCHREADER 579
Effectiveness of benzimidazole, benomyl, and Thiabendazole in reducing ozone injury to Pinto beans
M. PELLISSIER, N. L. LACASSE, and H. COLE, JR. 580
Effects of weed control in grain sorghum on subsequent incidence of Verticillium wilt in cotton ..... E. B. MINTON 582
Effect of infection by Ustilago striiformis var. agrostidis on inflorescence development on Agrostis palustris
C. F. HODGES 583
Sap transmission of chlorotic leaf spot and stem-grooving viruses to apple ..... R. M. GILMER and J. K. UYEMOTO 585

No. 6—JUNE

Metabolism and carbohydrate composition in barley yellow dwarf virus-infected wheat ..... S. G. JENSEN 587
Latent infection in avocado fruit due to Colletotrichum gloeosporioides .. N. BINYAMINI and M. SCHIFFMANN-NADEL 592
Production of antifungal substances active against Rhizoctonia solani in chitin-amended soil ..... B. SNEH and Y. HENIS 595
A strawberry fruit rot caused by Colletotrichum fragariae ..... C. M. HOWARD 600
Properties of a volatile fungistatic factor in soil ..... M. ROMINE and R. BAKER 602
Prevention of apothecial formation in Gloeotinia temulenta by systemic and protectant fungicides ..... J. R. HARDISON 605
Prevention of ascocarp formation in Claviceps purpurea by fungicides applied over sclerotia at the soil surface
J. R. HARDISON 609
A soybean disease caused by Neocosmospora vasinfecta ..... D. V. PHILLIPS 612
Effect of temperature on the synthesis of tobacco mosaic virus and X-protein in Nicotiana tabacum 'Xanthi-nc'
S. KAJITA and C. MATSUI 615
Inhibition of wood-rotting fungi by ellagitannins in the heartwood of Quercus alba ..... J. H. HART and W. E. HILLIS 620
Propagules of Pyrenophora trichostoma ..... R. M. HOSFORD, JR. 627
Distribution and metabolic fate of the fungicide benomyl in dwarf pea ..... M. R. SIEGEL and A. J. ZABBIA, JR. 630
Sulfide inhibition of oxidases in rice roots ..... A. I. ALLAM and J. P. HOLLIS 634
Concentration of maize dwarf mosaic virus in susceptible and resistant corn hybrids ..... R. K. JONES and S. A. TOLIN 640
Heat-induced susceptibility to nonpathogens and cross-protection against Phytophthora megasperma var. sojae in soybean
D. W. CHAMBERLAIN 645
Comparative pathogenicity of Calonectria theae and Cylindrocladium scoparium to leaves and roots of azalea
S. A. ALFIERI, JR., R. G. LINDERMAN, R. H. MORRISON, and E. K. SOBERS 647
Fusarium wilt of susceptible and resistant tomato isolines: histochemistry of vascular browning
M. E. MACE, J. A. VEECH, and C. H. BECKMAN 651
Histopathology and pathogenicity of Botryosphaeria dothidea on blueberry stems ..... R. D. MILHOLLAND 654

Resistance in tomato to six anthracnose fungi ..... T. H. BARKSDALE 660

Simultaneous infections of citrus leaves with Tristeza virus and mycoplasmalike organism
MING-HSIUNG CHEN, T. MIYAKAWA, and C. MATSUI 663

Abstracts presented at the twenty-ninth annual meeting of the Potomac Division of The American Phytopathological Society 667

PHYTOPATHOLOGICAL NOTES

The development of a selective medium for Pseudomonas glycinea ..... C. LEBEN 674

Temperature and light effects on cultural differences between races T and O of Helminthosporium maydis
K. A. FUKUKI and M. ARAGAKI 676

Relationship of isolate source to virulence of Pseudomonas syringae on Phaseolus vulgaris
S. M. SAAD and D. J. HAGEDORN 678

No. 7—JULY

John Shaw Boyce, 1889-1971 ..... J. R. HANSBROUGH 681

Randall Rich Kincaid, 1903-1971 ..... W. B. TAPPAN and W. H. CHAPMAN 682

Effect of ozone on yield of sweet corn ..... A. S. HEAGLE, D. E. BODY, and E. K. POUNDS 683

Stimulation of spore germination of Thielaviopsis basicola by fatty acids from rhizosphere soil
G. C. PAPAVIZAS and M. F. KOVACS, JR. 688

Virginia crab apple decline ..... H. E. WATERWORTH 695

Pathology of strawberry root rot caused by Ceratobasidium species
S. WILHELM, P. E. NELSON, H. E. THOMAS, and H. JOHNSON 700

Soil salinity related to ponderosa pine tipburn ..... R. A. SPOTTS, J. ALTMAN, and J. M. STALEY 705

Cuticle layer as a determining factor for the formation of mature appressoria of Erysiphe graminis on wheat and barley
S. L. YANG and A. H. ELLINGBOE 708

Assessment of microsclerotia of Verticillium albo-atrum in field soils
L. J. ASHWORTH, JR., J. E. WATERS, A. G. GEORGE, and O. D. MC CUTCHEON 715

Production of the phytoalexin, hydroxyphaseollin, in soybean leaves inoculated with tobacco necrosis virus
W. L. KLARMAN and F. HAMMERSCHLAG 719

Factors influencing black rot lesion development in resistant and susceptible cabbage .... T. STÄUB and P. H. WILLIAMS 722

Culture of a mycoplasmalike organism associated with stubborn disease of citrus
A. E. A. FUDL-ALLAH, E. C. CALAVAN, and E. C. K. IGWEGBE 729

Host virulence and the Hypomyces stage of Fusarium solani f. sp. pisi ..... T. MATUO and W. C. SNYDER 731

Isolation of Cylindrocladium from soil or infected azalea stems with azalea leaf traps ..... R. G. LINDERMAN 736

Isolation and characterization of a virus from Saguaro cactus ..... G. M. MILBRATH and M. R. NELSON 739

Abstracts of the papers accepted for publication at the Sixty-Fourth Annual Meeting of The American Phytopathological Society, Mexico City, Mexico 4-8 August, 1972 743

No. 8—AUGUST

Abstracts for the 1972 Annual Meeting of the Southern Division of The American Phytopathological Society 801

Deoxyribonuclease digestion of the nucleic acid from carnation etched ring virus
I. FUJISAWA, M. RUBIO-HUERTOS, and C. MATSUI 810

Factors affecting purification of maize dwarf mosaic virus from corn ..... R. K. JONES and S. A. TOLIN 812

Sclerospora sorghi in corn: its location in carpellate flowers and mature seeds
B. L. JONES, J. C. LEEPER, and R. A. FREDERIKSEN 817

The influence of storage temperature on recovery of Pythium spp. and Meloidogyne incognita from field soils
J. K. GOLDEN, W. M. POWELL, and F. F. HENDRIX, JR. 819

Viruslike particles in Penicillium brevi-compactum and P. stoloniferum hyphae and spores
G. R. HOOPER, H. A. WOOD, R. MYERS, and R. F. BOZARTH 823

Witches'-broom of willow: Salix yellows ..... F. O. HOLMES, H. HIRUMI, and K. MARAMOROSCH 826

Influence of soil temperature and moisture on survival and growth of strands of Phymatotrichum omnivorum
J. E. WHEELER and R. B. HINE 828

Purification and properties of a severe strain of peanut mottle virus ..... M. K. C. SUN and T. T. HEBERT 832

Top necrosis and cellular changes in soybean doubly infected by soybean mosaic and bean pod mottle viruses
Y-S. LEE and J. P. ROSS 839

Response of backcross hybrids and three-species combinations of Ulmus pumila, U. japonica, and U. rubra to inoculation with Ceratocystis ulmi ..... D. T. LESTER and E. B. SMALLEY 845

Response of Ulmus pumila and U. pumila × rubra hybrids to inoculation with Ceratocystis ulmi
D. T. LESTER and E. B. SMALLEY 848

Colonization of stem segments and chitin particles by Rhizoctinia solani in soil ..... B. SNEH, J. KATAN, and Y. HENIS 852

Fluorescing materials associated with vein blackening and necrosis in leaves of black rot-resistant cabbage
T. STAUB and P. H. WILLIAMS 858

A genetic analysis of leaf rust resistance in Red River 68 wheat ..... G. D. STATLER 866

Several aspects of the ecology and pathology of Fusarium oxysporum f. sp. cepae ..... G. S. ABAWI and J. W. LORBEER 870

Elongation of secondary hyphae and transfer of ^{35}S from barley to Erysiphe graminis f. sp. hordei during primary infection ..... S-C. HSU and A. H. ELLINGBOE 876

Relationship of ammonia to necrosis of pepper leaf tissue during colonization by Xanthomonas vesicatoria
R. E. STALL, C. B. HALL, and A. A. COOK 882

Nature of the inhibitory effect of bean pod mottle virus on local lesion production by soybean mosaic virus on bean
Y-S. LEE and J. P. ROSS 887

Influence of polychromatic light, carbohydrate source, and pH on conidiation of Botryotinia squamosa
R. R. BERGQUIST, R. K. HORST, and J. W. LORBEER 889

Influence of Endogone mycorrhiza on Phytophthora rot of soybean ..... J. P. ROSS 896

A root disease of pine, Araucaria, and Eucalyptus in Brazil caused by a new species of Cylindrocladium
C. S. HODGES and L. C. MAY 898

Verticillium albo-atrum: the quantitative relationship between inoculum density and infection of cotton
L. J. ASHWORTH, JR., O. D. MC CUTCHEON, and A. G. GEORGE 901

Sweet potato little-leaf (witches'-broom) associated with a mycoplasmalike organism
R. P. KAHN, R. H. LAWSON, R. L. MONROE, and S. HEARON 903

Physiological changes in pathogen-free tissue of Ulmus americana induced by Ceratocystis ulmi
W. R. LANDIS and J. H. HART 909

Scab of pyracantha, loquat, toyon, and kageneckia ..... R. D. RAABE and M. W. GARDNER 914

Incidence of tobacco leaf microflora in relation to brown spot disease and fungicidal treatment
H. W. SPURR, JR., and R. E. WELTY 916

An isolate of barley yellow dwarf virus transmitted specifically by Schizaphis graminum
R. A. JOHNSON and W. R. ROCHOW 921

Kaskaskia gleditsiae gen. et sp. nov. parasitic on thornless honey locust in Illinois G. L. BORN and J. L. CRANE 926

PHYTOPATHOLOGICAL NOTES

Effect of inoculation sequence and humidity on infection of Puccinia recondita by the mycoparasite Darluca filum ..... D. P. SWENDSRUD and L. CALPOUZOS 931

Respiration pattern of lemon fruit infected with Phytophthora citrophthora. E. COHEN and M. SCHIFFMANN-NADEL 932

Cytochromes in virulent fixed forms of Agrobacterium tumefaciens
R. BELTRA, J. RODRIGUEZ DE LECEA, and D. LOPEZ-ABELLA 933

Morphology of mycoplasmalike bodies associated with peach X-disease in Prunus persica
J. H. MAC BEATH, G. NYLAND, and A. R. SPURR 935

Inhibition of F-2 (Zearalenone) biosynthesis and Perithecium production in Fusarium roseum 'Graminearum'
J. C. WOLF, J. R. LIEBERMAN, and C. J. MIROCHA 937

Aggressiveness in Ceratocystis ulmi ..... F. W. HOLMES, H. M. HEYBROEK, and J. N. GIBBS 939

Discoloration and fluorescence in cotton fiber caused by Pseudomonas sp. ..... S. M. MC CARTER 940

No. 9—SEPTEMBER

Kermit William Kreitlow, 1913-1971 ..... S. A. OSTAZESKI 943

Estimating damage to wheat caused by Puccinia recondita tritici
J. R. BURLEIGH, A. P. ROELFS, and M. G. EVERSMEYER 944

Development of linear equations for predicting wheat leaf rust
J. R. BURLEIGH, M. G. EVERSMEYER, and A. P. ROELFS 947

Characterization of a factor or resistance in curly top virus-resistant tomatoes ..... P. E. THOMAS and M. W. MARTIN 954

Purification and properties of carnation mottle virus and its ribonucleic acid ... H. E. WATERWORTH and J. M. KAPER 959

Physiological characteristics of systemic toxemia in soybean ..... J. DUECK, V. B. CARDWELL, and B. W. KENNEDY 964

Disease determinant of Helminthosporium maydis Race T ..... S. M. LIM and A. L. HOOKER 968

Phytophthora cinnamomi, a cause of lethal disease in indigenous plant communities in Western Australia . F. D. PODGER 972

Relationship between population densities of Meloidogyne hapla and crop losses in summer-maturing vegetables in Ontario
T. H. A. OLTHOF and J. W. POTTER 981

Discovery and characterization of elm mosaic virus in Iowa
R. E. FORD, H. E. MOLINE, G. L. MCDANIEL, D. E. MAYHEW, and A. H. EPSTEIN 987

Characteristics of asexual sporulation in Phytophthora palmivora and Phytophthora parasitica nicotianae
R. ALCONERO and A. SANTIAGO 993

A selective medium for pectolytic fluorescent pseudomonads ..... D. C. SANDS, L. HANKIN, and M. ZUCKER 998

Tobacco streak virus in black raspberry ..... R. H. CONVERSE 1001

Low night temperature and blast disease development on rice ..... K. MANIBHUSHANRAO and P. R. DAY 1005

Evaluation of systemic fungicides and mineral oil adjuvants for the control of mal secco disease of lemon plants ..... Z. SOLEL, J. PINKAS, and G. LOEBENSTEIN 1007

Colonization of wheat seedlings by Cephalosporium gramineum in relation to symptom development ..... M. V. WIESE 1013

Plant and aphid protein patterns as influenced by pea enation mosaic virus ..... G. A. DE ZOETEN and N. RETTIG 1018

Identification of an ash strain of tobacco ringspot virus ..... C. R. HIBBIN and R. F. BOZARTH 1023

Effects of foliar applications of a benomyl-oil-water emulsion on the epidemiology of Cercospora leaf spot on peanuts ..... D. H. SMITH and F. L. CROSBY 1029

Growth of Puccinia graminis f. sp. tritici on a defined medium ..... A. S. FOUDIN and W. K. WYNN 1032

Factors affecting the effectiveness of sclerotia of Typhula idahoensis as inoculum
R. M. DAVIDSON, JR. and G. W. BRUEHL 1040

Ultrastructural comparison of microbodies in pathogenic and saprophytic hyphae of Fusarium oxysporum f. sp. lycopersici ..... W. P. WERGIN 1045

'Culmorum' from carnation ..... A. H. MICHAEL and P. E. NELSON 1052

Genetics of heterokaryosis in Thanatephorus cucumeris
N. A. ANDERSON, H. M. STRETTON, J. V. GROTH, and N. T. FLENTJE 1057

Fusarium spp. as colonists and potential pathogens in root zones of grassland plants ..... W. A. KREUTZER 1066

Aerial detection of maize dwarf mosaic virus-diseased corn ..... B. S. AUSMUS and J. W. HILTY 1070

Detection of Pseudomonas glycinea in soybean seed lots ..... R. D. PARASHAR and C. LEBEN 1075

Comparative gel-electrophoresis studies of ribosomal proteins of Erwinia species and members of the Enterobacteriaceae ..... C. I. KADO, N. W. SCHAAD, and M. G. HESKETT 1077

Virulence of Corynebacterium michiganense isolates on Lycopersicon accessions ..... B. D. THYR 1082

Tolerance of fruit of different tomato cultivars to soft rot ..... J. A. BARTZ and J. P. CRILL 1085

Sunflower yellows, a new disease caused by Phialophora sp ..... J. A. HOES 1088

PHYTOPATHOLOGICAL NOTES

Additional genes for resistance to Pseudomonas solanacearum in Solanum phureja
P. R. ROWE, L. SEQUEIRA, and L. C. GONZALEZ 1093

Negative relationship of stomatal size and density with resistance in sugar beet to Cercospora beticola .. E. G. RUPPEL 1095

Isolation of Tilletia caries from infected wheat plants ..... E. J. TRIONE 1096

Quantitative assay of Macrophomina phaseoli from soil ..... A. H. MC CAIN and R. S. SMITH, JR. 1098

Spore release in powdery mildews ..... S. M. PADY 1099

No. 10–OCTOBER

Abstracts of the fifty-sixth annual meeting of the Pacific Division of The American Phytopathological Society 1101

Abstracts of the 1972 annual meeting of the North Central Division of The American Phytopathological Society 1107

The soybean phytoalexin, hydroxyphaseollin, induced by fungicides ..... J. J. REILLY and W. L. KLARMAN 1113

Strains of rice tungro virus ..... A. ANJANEYULU and V. T. JOHN 1116

Interaction between Xanthomonas phaseoli, Xanthomonas vesicatoria, Xanthomonas campestris and Pseudomonas fluorescens in bean and tomato leaves ..... S. T. HSU and R. S. DICKEY 1120

A statistical method of predicting outbreaks of rice panicle blast ..... T. SASAKI and H. KATO 1126

Influence of culture age and temperature on germination of Helminthosporium sorokinianum conidia and on pathogenicity to Poa pratensis ..... C. F. HODGES 1133

Effect of field exposure on fungal invasion and deterioration of cotton seed
R. W. RONCADORI, O. L. BROOKS, and C. E. PERRY 1137

Dark therapy of bean rust ..... C. E. YARWOOD 1139

Association of beet western yellows and lettuce mosaic viruses with internal rib necrosis of lettuce
F. W. ZINK and J. E. DUFFUS 1141

Reaction of Erysiphe graminis f. sp. hordei to low levels of ozone ..... A. S. HEAGLE and ALICE STRICKLAND 1144

Induction of chlamydospore formation in Fusarium solani by abrupt removal of the organic carbon substrate ..... JANE ALDRICH MEYERS and R. J. COOK 1148

The effects of enzymatic digestion on the molecular weight and antigenic specificity of potato virus X protein ..... J. F. SHEPARD and G. A. SECOR 1154

Artificial inoculation of Pinus radiata with Scirrhia (Dothistroma) pini: effect of relative humidity and temperature on incubation ..... A. K. PARKER 1160

Perchlorate in Chilean nitrate as the cause of leaf rugosity in soybean plants in Chile ..... H. TOLLENAAR and C. M. B. 1164

Bacterial blight of soybeans: seedling infection during and after emergence ..... G. C. DAFT and C. LEBEN 1167

The effect of temperature and genetic background on host gene expression and interaction to Puccinia graminis tritici ..... N. H. LUIG and S. RAJARAM 1171

Monitoring the Epiphytic population of Erwinia amylovora on pear with a selective medium T. D. MILLER and M. N. SCHROTH 1175

Upward and lateral translocation of benomyl in strawberry J. F. NICHOLSON, J. B. SINCLAIR, J. C. WHITE, and B. L. KIRKPATRICK 1183

Postinfectional inhibitors from plants. III. Detoxification of capsidiol, an antifungal compound from peppers ..... E. W. B. WARD and A. STOESSL 1186

Environmental factors regulating sexual and asexual reproduction by Mycosphaerella ligulicola R. E. MC COY, R. K. HORST, and A. W. DIMOCK 1188

Relationship of temperature and humidity to development of Mycosphaerella lesions on Chrysanthemum R. E. MC COY and A. W. DIMOCK 1195

Susceptibility of sand pine to Phytophthora cinnamomi ..... E. W. ROSS and D. H. MARX 1197

Antagonistic interaction between Heterodera glycines and Rhizobium japonicum on soybean K. R. BARKER, D. HUISINGH, and S. A. JOHNSTON 1201

Enhancement of the infectivity, nucleoprotein concentration, and multiplication rate of cowpea chlorotic mottle virus in manganese-treated cowpea ..... W. O. DAWSON 1206

Spectral reflectance and transmittance of corn leaves infected with Helminthosporium maydis G. R. SAFIR, G. H. SVITS, and A. H. ELLINGBOE 1210

High pH-ammonia agar immunodiffusion for plant viruses ..... W. G. LANGENBERG and ELLEN M. BALL 1214

The formation of elongating secondary hyphae of Erysiphe graminis and the segregation of Ml genes in barley ..... S. L. YANG, J. G. MOSEMAN, and A. H. ELLINGBOE 1219

Effect of temperature and boll injuries on development of Diplodia boll rot of cotton ..... S. M. MC CARTER 1223

No. 11–NOVEMBER

William Earl Cooper, 1917-1970 ..... D. E. ELLIS, J. C. WELLS, and C. J. NUSBAUM 1227

George John Stessel, 1919-1972 ..... B. M. ZUCKERMAN 1228

Mathilde Bensaude, 1890-1969 ..... E. S. JONES 1229

Letter to the Editor: the enigma of mycoplasma in plants and insects ..... K. MARAMOROSCH 1230

Growth and distribution of Fusarium oxysporum f. sp. lycopersici in near-isogenic lines of tomato resistant or susceptible to wilt ..... D. M. ELGERSMA, W. E. MAC HARDY, and C. H. BECKMAN 1232

Colonization of gnotobiotically grown peanuts by Aspergillus flavus and selected interacting fungi T. R. WELLS, W. A. KREUTZER, and D. L. LINDSEY 1238

Histochemical demonstration of transitory esterase activity in Venturia inaequalis
R. L. NICHOLSON, J. KUĆ, and E. B. WILLIAMS 1242

Effects of fluoride on pollen germination, pollen tube growth, and fruit development in tomato and cucumber
C. W. SULZBACH and M. R. PACK 1247

Fine structure of Ceratocystis ulmi in elm wood ..... C. R. KRAUSE and C. L. WILSON 1253

The localization of Fusarial infections in the vascular tissue of single-dominant-gene resistant tomatoes
C. H. BECKMAN, D. M. ELGERSMA, and W. E. MAC HARDY 1256

Internal seed-borne nature of Sclerotinia sclerotiorum and Phomopsis sp. and their effects on soybean seed quality
J. F. NICHOLSON, O. D. DHINGRA, and J. B. SINCLAIR 1261

Multiplication of Pseudomonas cepacia in onion leaves .....S. O. KAWAMOTO and J. W. LORBEER 1263

Histology of onion leaves infected with Pseudomonas cepacia .....S. O. KAWAMOTO and J. W. LORBEER 1266

Light affects penetration and infection of pines by dwarf mistletoe .....R. F. SCHARPF 1271

Serological relationship between beet western yellows and turnip yellows viruses .....J. E. DUFFUS and G. E. RUSSELL 1274

Defoliation-induced chemical changes in sugar maple roots stimulate growth of Armillaria mellea ..... P. M. WARGO 1278

Particle numbers associated with mechanical and aphid transmission of some plant viruses
H. L. WALKER and T. P. PIRONE 1283

A selective medium for assay of Colletotrichum coccodes in soil .....J. D. FARLEY 1288

Relationship between stem pitting in peach and in other Prunus species ..... S. M. MIRCETICH and E. L. CIVEROLO 1294

Intracellular morphology of two tobacco mosaic virus strains in, and cytological responses of, systemically susceptible potato plants .....KANG-CHIEN LIU and J. S. BOYLE 1303

The role of Tylenchorhynchus dubius in the development of Fusarium blight of Merion Kentucky Bluegrass
J. M. VARGAS, JR., and C. W. LAUGHLIN 1311

Brown stem rot resistance and its modification by soybean mosaic virus in soybeans.... H. TACHIBANA and L. C. CARD 1314

Histopathology of carnation infected with Fusarium oxysporum f. sp. dianthi. . B. W. PENNYPACKER and P. E. NELSON 1318

Electrolyte leakage and membrane damage in relation to bacterial population, pH, and ammonia production in tobacco leaf tissue inoculated with Pseudomonas pisi .....R. N. GOODMAN 1327

Pythium myriotylum and Fusarium solani as cofactors in a pod-rot complex of peanut .....Z. R. FRANK 1331

Influence of photoperiod, plant age, and stage of development on brown stem rot of soybean.....D. V. PHILLIPS 1334

Histopathology of Pelargonium species infected with Xanthomonas pelargonii ...S. H. WAINWRIGHT and P. E. NELSON 1337

Stimulation of Rhizomorph production by Armillaria mellea with lipid from tree roots
A. R. MOODY and A. R. WEINHOLD 1347

Absence of a common antigen relationship between Corynebacterium insidiosum and Medicago sativa as a factor in disease development..... R. B. CARROLL, F. L. LUKEZIC, and R. G. LEVINE 1351

PHYTOPATHOLOGICAL NOTES

Postinfection changes in chemical compounds of lemons caused by Phytophthora citrophthora
E. COHEN and M. SCHIFFMANN-NADEL 1361

Recovery of Cephalosporium gregatum from soybean straw .....L. E. GRAY 1362

Accummulation of wyerone in broadbean and demethylhomopterocarpin in jack bean after inoculation with Phytophthora megasperma var. sojae ..... N. T. KEEN 1365

Reciprocal pathogenicity of Glomerella cingulata isolated from Betula pendula and Malus sylvestris
R. J. STIPES and C. R. DRAKE 1366

Maize seed predisposed to fungal invasion and aflatoxin contamination by Helminthosporium maydis ear rot
B. DOUPNIK, JR. 1367

No. 12–DECEMBER

Role and survival of Monilinia fructicola in blighted peach branches ..... T. B. SUTTON and C. N. CLAYTON 1369

Development of a selective medium for Pseudomonas solanacearum ... A. D. KARGANILLA and I. W. BUDDENHAGEN 1373

Temperature-dependent resistance to tobacco ringspot virus in L8, a necrosis-prone tobacco cultivar .... J. W. HENDRIX 1376

Fusarium boll rot of cotton: pathogenicity and histopathology ..... R. H. SPARNICHT and R. W. RONCADORI 1381

Conidial germination and population of Aspergillus flavus in the geocarposphere of peanut ..... G. J. GRIFFIN 1387

Effect of Cercospora nicotianae infection on four major chemical constituents in cured tobacco leaves
J. R. STAVELY and J. F. CHAPLIN 1392

Vergosin and hemigossypol, antifungal compounds produced in cotton plants inoculated with Verticillium albo-atrum
A. I. ZAKI, N. T. KEEN, J. J. SIMS, and D. C. ERWIN 1398

Implication of Vergosin and hemigossypol in the resistance of cotton to Verticillium albo-atrum
A. I. ZAKI, N. T. KEEN, and D. C. ERWIN 1402

Ethylene production in Pinus radiata in response to Sirex-Amylostereum attack ..... L. SHAIN and W. E. HILLIS 1407

Translocation of 2-(4-thiazolyl) benzimidazole in maturing cotton plants
M. S. CHATRATH, S. D. LYDA, and A. LAUCHLI 1410

Root reduction and stem lesion development on soybeans by Phytophthora megasperma var. sojae
W. A. MEYER and J. B. SINCLAIR 1414

Axenic culture of Cronartium fusiforme ..... C. A. HOLLIS, R. A. SCHMIDT, and J. W. KIMBROUGH 1417

Sites of infection of Fusarium oxysporum f. pisi race 5 on peas ..... R. F. NYVALL and W. A. HAGLUND 1419

Interaction between Fusarium oxysporum f. sp. conglutinans and turnip mosaic virus in Brassica campestris var. chinensis seedlings ..... A. A. REYES and K. C. CHADHA 1424

Alterations in structural proteins from chloroplast membranes of bacterially induced hypersensitive tobacco leaves
JENG-SHENG HUANG and R. N. GOODMAN 1428

Grove application of benomyl and its persistence in orange fruit ..... G. E. BROWN and L. G. ALBRIGO 1434

A tissue culture system for studying disease resistance: the Black Shank disease in tobacco callus cultures
J. P. HELGESON, J. D. KEMP, G. T. HABERLACH, and D. P. MAXWELL 1439

Crown rust tolerance of Avena sativa-type oats derived from wild Avena sterilis ..... M. D. SIMONS 1444

Stunting of citrus seedlings in fumigated nursery soils related to the absence of endomycorrhizae
G. D. KLEINSCHMIDT and J. W. GERDEMANN 1447

Effects of elevated temperature on the ultrastructure of mycoplasmalike organisms in periwinkle
A. ZELCER, G. LOEBENSTEIN, and M. BAR-JOSEPH 1453

Phytoalexin production in locally cross-protected Harosoy and Harosoy-63 soybeans W. E. SVOBODA and J. D. PAXTON 1457

Induced interference by synthetic polyanions with the infection of tobacco mosaic virus
A. STEIN and G. LOEBENSTEIN 1461

Grasses differentiating sugarcane mosaic and maize dwarf mosaic viruses ..... M. TOSIC and R. E. FORD 1466

Additional data on the thermal sensitivity of selected fungi associated with Agaricus bisporus
P. J. WUEST and R. K. MOORE 1470

PHYTOPATHOLOGICAL NOTES

Datura stramonium, a local lesion host for certain isolates of cauliflower mosaic virus
M. C. Y. LUNG and T. P. PIRONE 1473

Extraction of a volatile factor from soil-inducing fungistasis ..... T. S. HORA and R. BAKER 1475

Electron microscopy of viruslike particles found in mosaic-diseased raspberries in France .. C. PUTZ and R. MEIGNOZ 1477

Index for 1972 ..... *1*
Errata *31*
Tables of Contents for 1972 i

U. S. POSTAL SERVICE

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIR .ULATION

(Act of August 12, 1970: Section 3685, Title 39, United States Code)

SEE INSTRUCTIONS ON PAGE 2 (REVERSE)

1. TITLE OF PUBLICATION: PHYTOPATHOLOGY

2. DATE OF FILING: Sept. 29 1972

3. FREQUENCY OF ISSUE: monthly

4. LOCATION OF KNOWN OFFICE OF PUBLICATION (Street city, county, state, ZIP code) (Not printers): 3340 Pilot Knob Road, St. Paul MN 55121 - Dakota County

5. LOCATION OF THE HEADQUARTERS OR GENERAL BUSINESS OFFICES OF THE PUBLISHERS (Not printers): 3340 Pilot Knob Road, St. Paul MN 55121 -

6. NAMES AND ADDRESSES OF PUBLISHER, EDITOR, AND MANAGING EDITOR

PUBLISHER (Name and address): THE AMERICAN PHYTOPATHOLOGICAL SOCIETY, 3340 Pilot Knob Road, St. Paul MN 55121

EDITOR (Name and address): Robert Aycock, Dept. of Plant Path., No. Carolina State Univ., Raleigh, N.C.

MANAGING EDITOR (Name and address): ROGER PAULSON, 3340 Pilot Knob Road, St. Paul MN 55121

7. OWNER (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given.)

NAME	ADDRESS
THE AMERICAN PHYTOPATHOLOGICAL SOCIETY	3340 Pilot Knob Road, St. Paul MN 55121

8. KNOWN BONDHOLDERS, MORTGAGEES, AND OTHER SECURITY HOLDERS OWNING OR HOLDING 1 PERCENT OR MORE OF TOTAL AMOUNT OF BONDS, MORTGAGES OR OTHER SECURITIES (If there are none, so state):

NAME	ADDRESS

9. FOR OPTIONAL COMPLETION BY PUBLISHERS MAILING AT THE REGULAR RATES (Section 132.121, Postal Service Manual)

39 U. S. C. 3626 provides in pertinent part: "No person who would have been entitled to mail matter under former section 4359 of this title shall mail such matter at the rates provided under this subsection unless he files annually with the Postal Service a written request for permission to mail matter at such rates."

In accordance with the provisions of this statute, I hereby request permission to mail the publication named in item 1 at the reduced postage rates presently authorized by 39 U. S. C. 3626.

(Signature and title of editor, publisher, business manager, or owner)

10. FOR COMPLETION BY NONPROFIT ORGANIZATIONS AUTHORIZED TO MAIL AT SPECIAL RATES (Section 132.122, Postal Manual) (Check one)

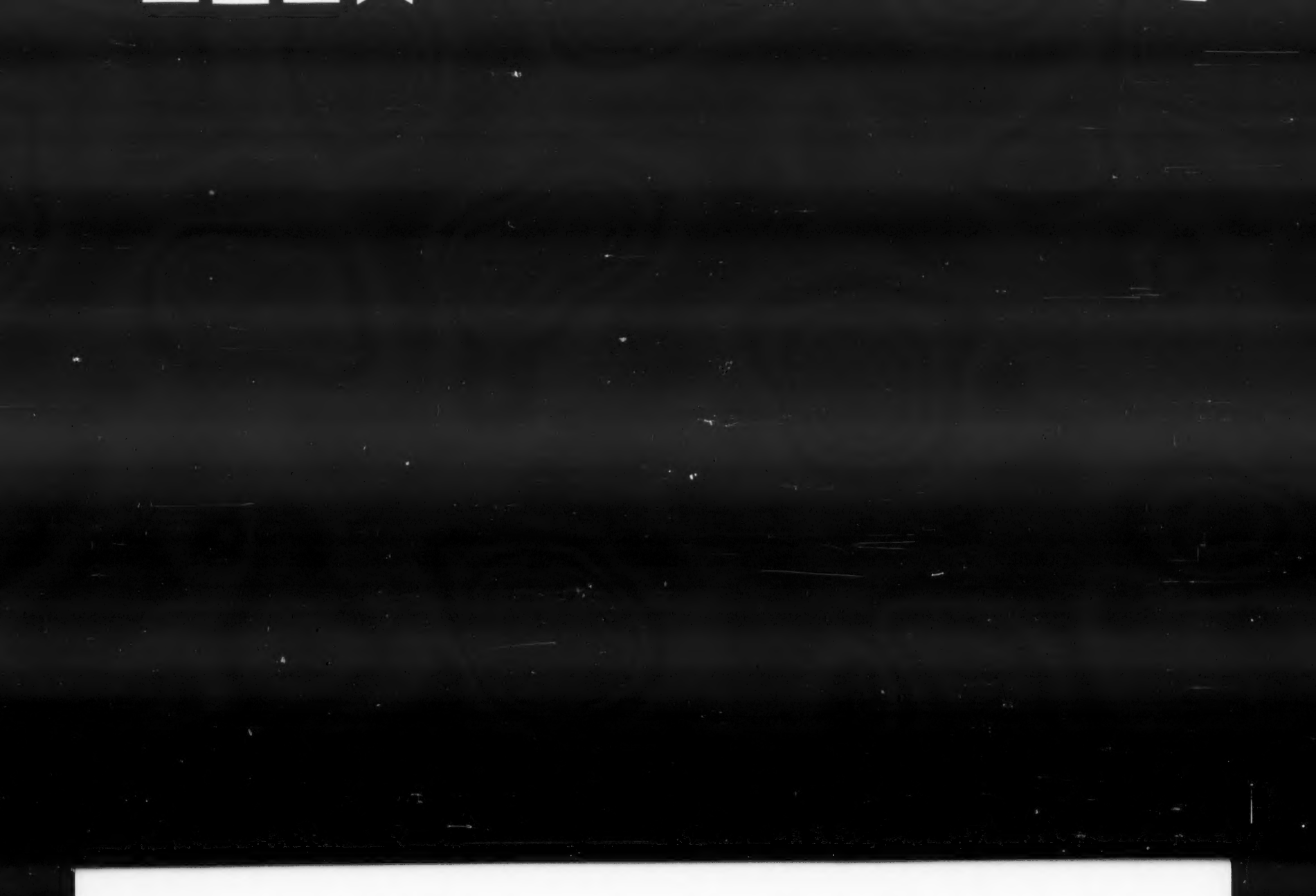
The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes:

☒ Have not changed during preceding 12 months ☐ Have changed during preceding 12 months

(If changed, publisher must submit explanation of change with this statement.)

11. EXTENT AND NATURE OF CIRCULATION	AVERAGE NO. COPIES EACH ISSUE DURING PRECEDING 12 MONTHS	ACTUAL NUMBER OF COPIES OF SINGLE ISSUE PUBLISHED NEAREST TO FILING DATE
A. TOTAL NO. COPIES PRINTED (Net Press Run)	5368	5200
B. PAID CIRCULATION 1. SALES THROUGH DEALERS AND CARRIERS, STREET VENDORS AND COUNTER SALES		
2. MAIL SUBSCRIPTIONS		
C. TOTAL PAID CIRCULATION	4492	4679
D. FREE DISTRIBUTION BY MAIL, CARRIER OR OTHER MEANS 1. SAMPLES, COMPLIMENTARY, AND OTHER FREE COPIES	5	5
2. COPIES DISTRIBUTED TO NEWS AGENTS, BUT NOT SOLD		
E. TOTAL DISTRIBUTION (Sum of C and D)	4497	4684
F. OFFICE USE, LEFT-OVER, UNACCOUNTED, SPOILED AFTER PRINTING	871	516
G. TOTAL (Sum of E & F—should equal net press run shown in A)	5368	5200

I certify that the statements made by me above are correct and complete.

(Signature of editor, publisher, business manager, or owner) ▶ Raymond Mullen

PS Form 3526 July 1971